

Blueprint:

Planned By:

Approved By:

SEQ	TASK OPERATIONS	
10	<b>INVENTORY OUT</b> Remove parts from inventory  <b>BILL OF MATERIAL</b> Qty Per Assy: 1 SWA6A-100 Lower End Qty Per Assy: 1 SWA6A-200 Upper End Qty Per Assy: 1 SWA6A-300 Bearing Housing Qty Per Assy: 1 SWA6A-400 Thrust Washer Qty Per Assy: 1 SWA6A-500 Semi Ring Qty Per Assy: 1 SWA6A-600 Collar Qty Per Assy: 2 SWA6A-700 Wire Clamp Qty Per Assy: 1 SWA6A-800B Connector Bushing - 330 & 430 Qty Per Assy: 1 SWA6A-900B Rotary Connector - 3 wire #330 Qty Per Assy: 4 188-FSCS-1032-5/8 92210A303 FLAT POINT SOCKET SCREW Qty Per Assy: 1 SWA6A-1100 Upper DU Bearing Qty Per Assy: 1 SWA6A-1200 Lower DU Bearing Qty Per Assy: 1 SWA6A-1300 Cylindrical Roller Thrust Bearing Qty Per Assy: 1 SWA6A-1400 Circlip, Internal Qty Per Assy: 1 188-FPSS-1032-1/2 18-8 SS - Flat Point Socket Setscrew- 10-32 x 1/2" Qty Per Assy: 1 SWA6A-1800 Cover Qty Per Assy: 6 SWA6A-1900 Female Spade Terminal - 1/4" Qty Per Assy: 1 EL-PLUG-F 3-Prong Female Spade Connector Qty Per Assy: 1 EL-PLUG-M 3-Prong Male Spade Plug Qty Per Assy: 6 EL314-SJTOW Electrical Wire 3/14 SJTOW Qty Per Assy: 1 600.1311 CANAM SWIVEL ID LABEL Qty Per Assy: 1 600.1319 CANAM ARROW LABEL Qty Per Assy: 1 C45-15-13 Lifting Bushing - SWA6A	OSP:No
20	<b>Assembly Documentation</b> Print appropriate assembly & test sheets.	OSP:No
30	<b>Assembly</b> Assemble IAW CMM	OSP:No
40	<b>In Process Inspection</b> Assembly must be inspected prior to lubricating and testing mechanism.	OSP:No
50	<b>Test</b> Test assembly IAW CMM. Record results on test sheet.	OSP:No
60	<b>Documentation &amp; Time Log</b>	OSP:No

Apical Industries, Inc.

MANUFACTURING PRODUCT TEMPLATE

SWA6A-3

Swivel - 6,000 Lbs. - 3 Wire

PN: SWA6A-3

Desc: Swivel - 6,000 Lbs. - 3 Wire

Rev: A

Printed: 1/26/2012

Time: 2:48:35 PM

Blueprint:

Planned By:

Approved By:

Include owners manual, CRC. Sign off traveller.

70 Pre-Inspection

OSP:No

80 Final Inspection

OSP:No

90 INVENTORY IN

Place parts into inventory.

OSP:No



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OM-SWA6A  
REV. A  
07/06/11

## Owners Manual

### **Canam SWA6A Rotary Contact Swivel**



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6000-LB. ROTARY CONTACT SWIVEL SWA6A

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OM-SWA6A  
Rev. A  
07/06/11

### DETAILS OF REVISIONS

Rev.	Date	Page	Description	Approved
N/C	06/04/09	All	Initial Release	P. Bravo
A	07/06/11	All	Was Rev N/C on 06/04/09 Is Rev A on 07/06/11	P. Bravo
		3	Revised List of Effective Pages	
		5	Revised Section 1.0	
		6	Revised Section 2.1	
		7	Revised Section 2.2	
		8	Revised Section 3.0	
			Revised Section 3.2	



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Section 3 Maintenance	8	A
Section 4 SWA6A Parts List	10	A



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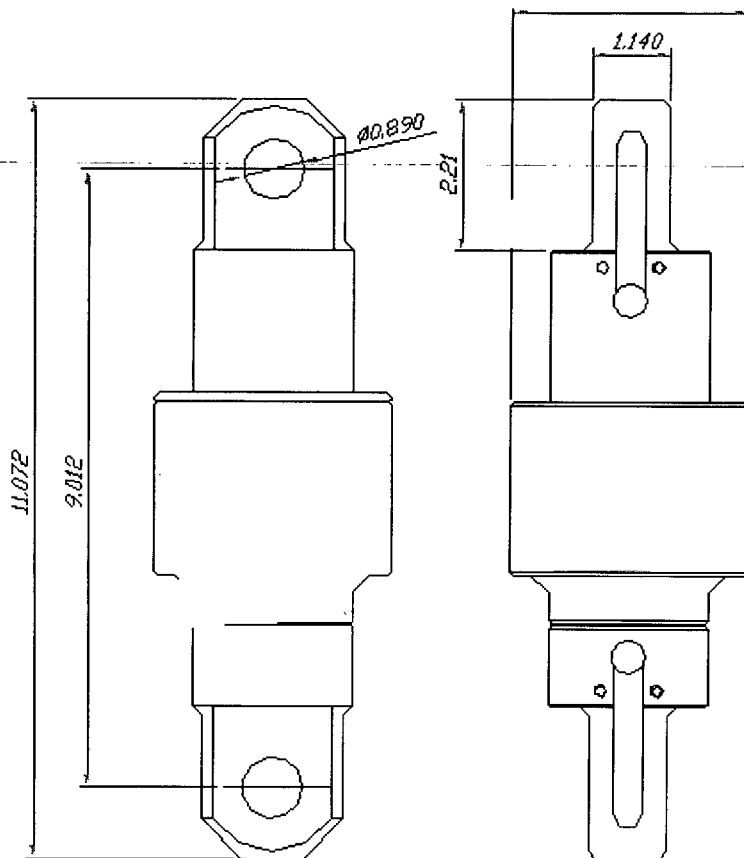


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## **Section 1.0: INTRODUCTION**

The Model SWA6A swivel has been designed for use in conjunction with cargo hooks and carousels to engage, lift, and transport external loads suspended from a helicopter. Electric currents continuously pass through the swivel to the bottom of the line, preventing any curling or kinking of the long line.



### **1.1 PRODUCT FEATURES:**

- The SWA6A swivel is made of stainless steel.
  - There are no electrical brushes to achieve electrical contact through the swivel. Instead we are using liquid mercury through a sealed module to produce conductivity. This reduces wear and problems associated with brushes.
  - It is produced in three parts fitted and held in place by a split ring and collar.
  - There are three bearings inside the swivel to accommodate for radial and weight loads placed on swivel during use.
  - The lifting holes are designed to accommodate a 4.75-ton shackle with a 7/8" pin.
  - The wire used is suited for extreme cold weather purposes and high flexibility.
- The swivel is designed to accommodate 5 different wire conductors: 2 wire, 3 wire, 4 wire, 6 wire or 8 wire. Depending on the wire configuration there are two different amperage ratings, 4 amp or 30 amps.
  - The use of an exterior electrical connection has been left to the requirements of the user.



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## **Section 2.0: TECHNICAL DATA**

### **2.1 SPECIFICATIONS:**

#### **Mechanical:**

Weight	10 lbs. (4.5 kg)
Lift capacity:	0 to 6,000 lbs. (2,721 kg)
Width:	3.43 inches (87 mm)
Overall length:	11.10 inches (282 mm)
Lifting hole size:	0.89-inch diameter (22.6 mm)
Mounting Flats:	1.14 inches wide (29 mm)
Mounting:	Top and Bottom lifting points
Ultimate design strength:	22,500 lbs. (10,205 kg)
Material:	Stainless Steel 17-4 PH

#### **Electrical:**

Voltage:	0-500V
AC/DC Operating temp:	-22°F to 122°F. (-30°C to 50°C)
Wire:	0-500 Volts AC/DC
Current:	<b>2 Wire:</b> White and Black wires 30A, Green not used.
	<b>3 Wire:</b> White, Black, and Green, All wires 30A.
	<b>4 Wire:</b> White and Brown wires 30A, Red & Green wires 4A.
	<b>6 Wire:</b> White, Yellow, Orange, and Brown wires 30A, Red and Green wires 4A.
	<b>8 Wire:</b> White, Black, Orange, Purple, Blue, and Yellow wires 30A, Red and Green wires 4A.

#### **Bearings:**

Cylindrical Roller Thrust Bearing:	Static 37,000 lbs. Dynamic 13,300 lbs.
Self Lubricating Bearings:	Radial load 27,891 lbs.
Grease:	NSN9150-21-905-7275 Hi-Tech EP 1.5





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## **2.2 ELECTRICAL CONNECTIONS:**

Excess vibration or mechanical shock will reduce life or cause connector failure. Some installations may require a shock isolation mounting.

### **External:**

The use of an exterior electrical connection has been left to the requirements of the user. It is not necessary to remove the wire clamps to install the exterior connectors. The wire clamps are designed to ensure that proper clamping pressure is maintained on the wire at all times.

### **Internal Connections:**

All connections are sealed in silicon. There are no mechanical contacts, such as brushes making through electrical conductivity. Instead a liquid mercury filled module is used to achieve conductivity.

The rotating connector is mercury based, if any has leaked out, this would cause the unit to fail. The module should be properly disposed of through proper recycling or mercury recover programs. Apical Industries will forward the spent module to a mercury recover facility. Wrap and package items in accordance with local, state and federal regulations. Please state on your paper work "For Recycling" and identify shipments with phone/fax numbers.

### **CAUTION:**

Do not solder on connectors or bend tabs as such misuse may cause connector failure and will void the warranty.



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### **Section 3.0: MAINTENANCE**

The overhaul interval for the SWA6A Swivel is every 1500 hours or every 3 years, whichever comes first.

The repair and/or overhaul must be completed using any one (1) of the following two (2) methods:

- I. By sending the hook to an approved facility or returning it to Apical Industries.
- II. Operator may perform repair and/or overhaul using an Apical Industries SWA6A Overhaul Kit (P/N: 648.4708) in accordance with Apical's Operator Overhaul Procedure Manual for the Canam Model SWA6A Swivel (Document: OOPM-SWA6A).

#### **3.1 WARRANTY:**

Apical Industries will warranty the product for workmanship for a period of 1 year. Internal components installed and manufactured from other manufactures are not covered by Apical Industries and are subject to OEM warranties. Apical Industries reserves the right to evaluate the product subject to warranty.

#### **3.2 OPERATION AND STORAGE:**

When in use or storage the unit is designed to work with the up arrow pointing up (sticker & stamp). The unit will work 90° from that plane, but care should be taken to never operate the unit upside down or store the unit in that manner.

Storage over a long period of time should not affect the unit as long as it is placed in the upright position.

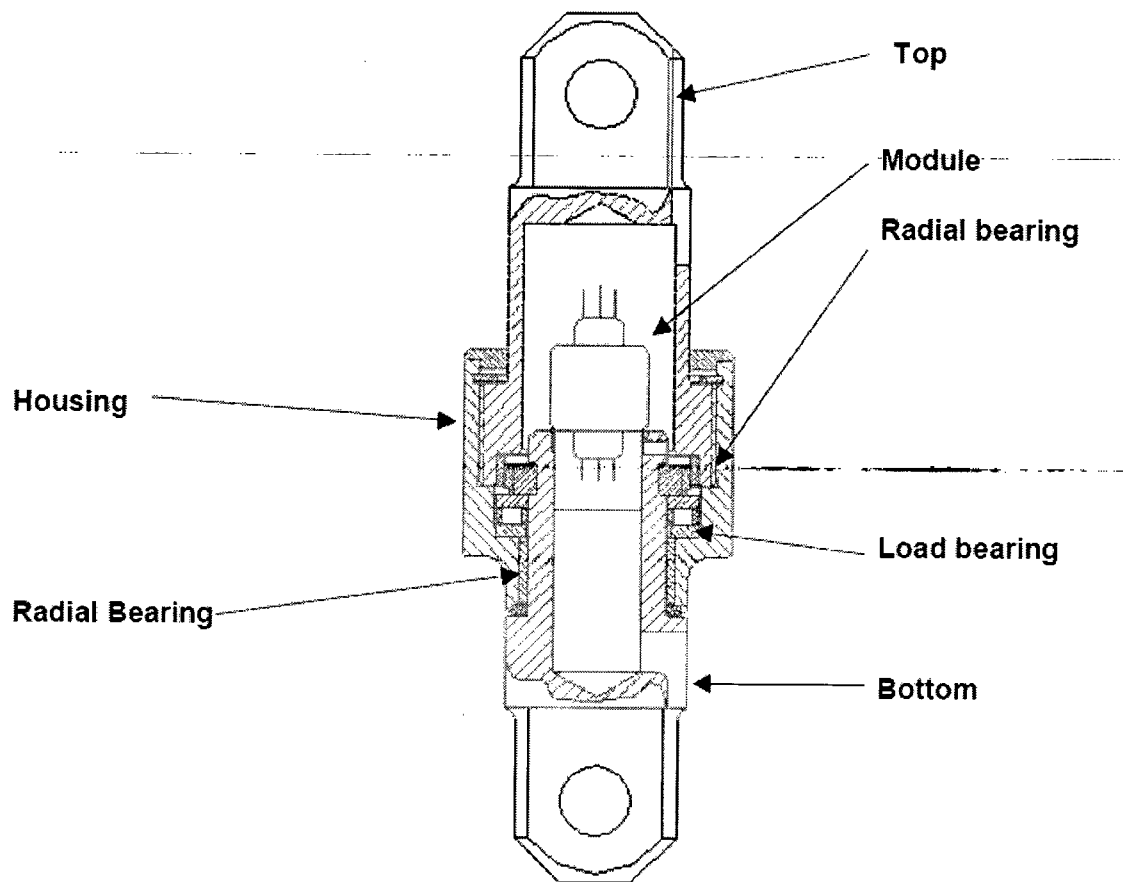
#### **3.3 WATER CONDITIONS:**

The swivel is designed to function and maintain electrical conductivity during wet weather and temperature change. If the swivel is dipped in water for a few seconds it will function properly.

If submerged for a prolonged period, it will be necessary to re-grease the unit and allow it to stand in the vertical position overnight. The grease in the unit should act as an internal water barrier for the bearings and the wire clamps have been sealed with silicone to prevent water penetration.

### 3.4 INSPECTION:

- Conduct visual inspection on the outside of the swivel assembly.
- Check for nicks, burrs, cracks or looseness of parts.
- Insure that the swivel rotates.
- Electrically: Use an Ohm-meter, check for conductivity against all wires and all wires for grounding against swivel body.



**Figure 1: Internal View**



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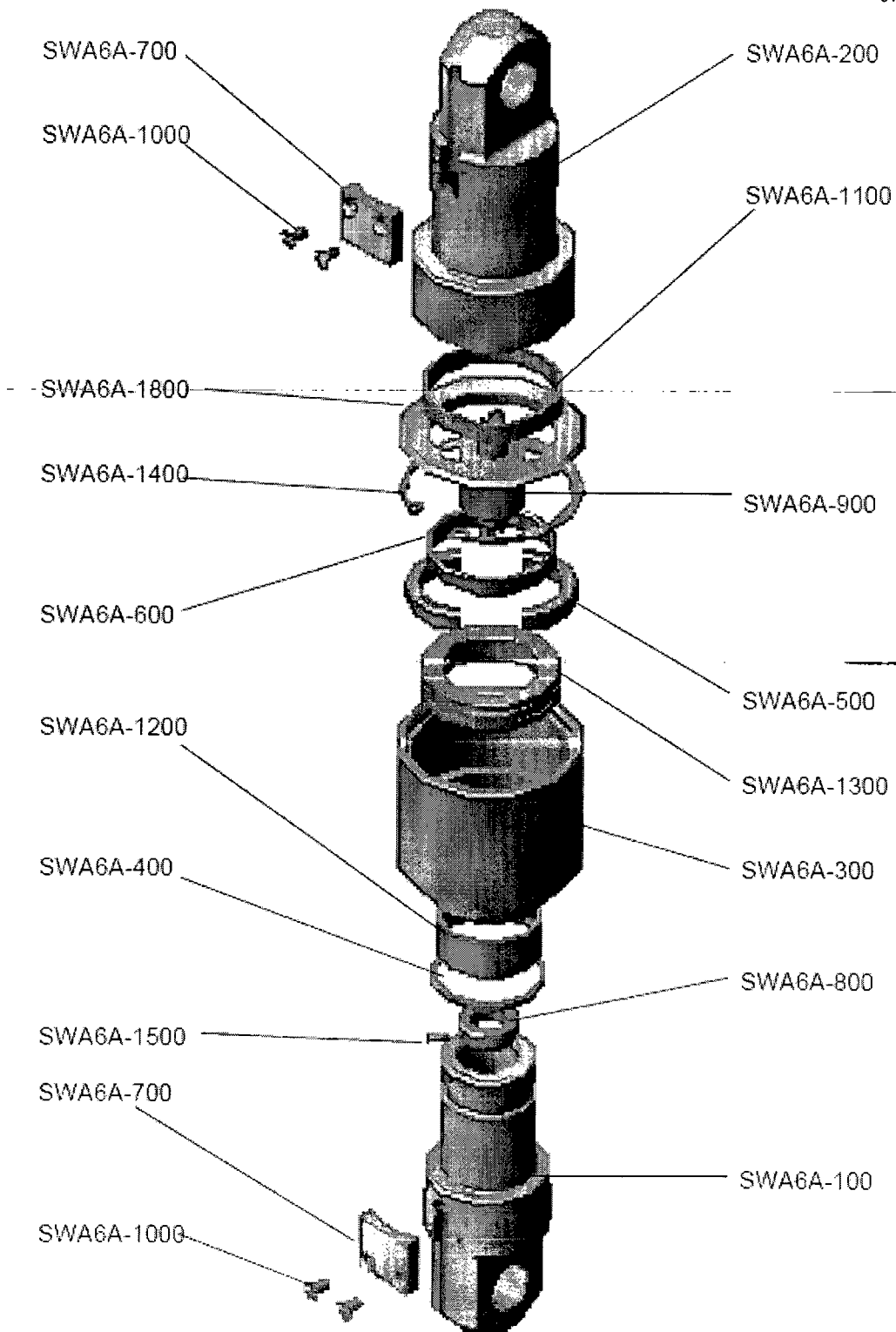
## **Section 4.0: SWA6A PARTS LIST**

<b>Part Number</b>	<b>Description</b>	<b>QTY</b>
SWA6A-100	Lower End	1
SWA6A-200	Upper End	1
SWA6A-300	Bearing Housing	1
SWA6A-400	Thrust Washer	1
SWA6A-500	Semi Rings	2
SWA6A-600	Collar	1
SWA6A-700	Wire Clamp	2
SWA6A-800A	Connector Bushing -230	Varies
SWA6A-800B	Connector Bushing -330 & 430	Varies
SWA6A-800C	Connector Bushing -630	Varies
SWA6A-900A	Rotary Contact-2 wire	Varies
SWA6A-900B	Rotary Contact-3 wire	Varies
SWA6A-900C	Rotary Contact-4 wire	Varies
SWA6A-900D	Rotary Contact-6 wire	Varies
SWA6A-900E	Rotary Contact-8 wire	Varies
SWA6A-1000	Wire Clamp Screw	4
SWA6A-1100	Upper DU Bearing	1
SWA6A-1200	Lower DU Bearing	1
SWA6A-1300	Cylindrical Roller Thrust Bearing	1
SWA6A-1400	Circlip, Internal	1
SWA6A-1500A	Set Screw	Varies
SWA6A-1500B	Set Screw	Varies
SWA6A-1600	Decal, UP Arrow	1
SWA6A-1700	Decal, ID	1
SWA6A-1800	Cover	1
SWA6A-1900	Female Spade Terminals .250	Varies
SWA6A-2000	Female Spade Terminals .125	Varies
SWA6A-2100	Wire – 14 Gauge – 3 Wire	Varies
SWA6A-2110	Wire -16 Gauge -Black	Varies
SWA6A-2120	Wire -16 Gauge -Red	Varies
SWA6A-2130	Wire -16 Gauge -Orange	Varies
SWA6A-2140	Wire -16 Gauge -Yellow	Varies
SWA6A-2150	Wire -16 Gauge -Green	Varies
SWA6A-2160	Wire -16 Gauge -Blue	Varies
SWA6A-2170	Wire -16 Gauge -Purple	Varies
SWA6A-2180	Wire -16 Gauge -White	Varies



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**Figure 2: Exploded View**



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# **OPERATOR OVERHAUL PROCEDURE MANUAL**

**For  
All Canam Model SWA6A Swivels**

OOPM-SWA6A

Rev. N/C

07/06/11

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SUBJECT:  
Overhaul Procedure Manual - SWA6A Swivel  
07/06/11

DOCUMENT:  
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## Log Of Revisions

<u>Rev.</u>	<u>Date</u>	<u>Page</u>	<u>Description</u>	<u>Approved</u>
N/C	07/06/11	All	Initial Release	P. Bravo

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## 1 Introduction

### 1.1 Purpose

The purpose of this document is to provide the customer with a detailed set of instructions necessary to complete the overhaul procedure for all Canam model SWA6A Swivels. This may be used as an alternative to sending the SWA6A Swivel to an approved facility or returning it to Apical for overhauls.

**NOTE:** It will be assumed that the reader of this manual is familiar with the Canam SWA6A Swivel Owner's Manual.

### 1.2 Precautions

The following precaution definitions will be used to indicate the seriousness of the hazard or condition:

**WARNING:** May be a maintenance procedure, practice, condition, etc., which could result in personal injury or loss of life.

**CAUTION:** May be a maintenance procedure, practice, condition, etc., which could result in damage or destruction of equipment.

**NOTE:** May be a maintenance procedure, practice, condition, etc., or statement which needs to be highlighted.

### 1.3 Definitions

The following terminology will be used describe defects and imperfections:

**Corrosion:** Chemical action on the surface either resulting in discoloration, a surface of oxide or in an advanced degree of removal of the original surface metal.

**Crack:** Fissure, which does not quite separate the metal.

**Dent/Nick:** Depression of surface metal without removal of material.

**Distortion:** Deviation from original shape.

**Scratch:** Narrow, shallow marks or lines resulting from movement of a particle or object across a surface.



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## 2 Preparation

Before the overhaul process may begin, the following preparations must be made.

### 2.1 Required Items

The following items are required to complete the overhauling process as outlined in this manual:

- **Apical SWA6A Overhaul Kit (P/N: 648.4708)**
- **Loctite #620 Retaining Compound**
- **Loctite #242 Threadlocker**
- **SAF-T-EZE Copper Anti-Seize (or similar)**
- **Metalon Hi-Tech EP 1.5 Grease (or similar)**
- **Dow Corning RTV Sealant, 732 Multi-Purpose Sealant (or similar)**
- **Scotch Label Protection Tape 356 (or similar)**
- **Standard Ohmmeter**
- **Parts Washing Solvent**
- **Aluminum Oxide 100/200/400, or Scotch Brite**
- **Raychem RNF-100 Heat-Shrink Tubing .25"exp - .125"rec (or equivalent)**

### 2.2 Parts List and Assembly Figures

A copy of the complete parts list and assembly figures found in the SWA6A Swivel Owner's Manual are included at the end of this document. They may be used as a reference source at any time.

Table 2.1 below lists all the parts contained in the Apical SWA6A Overhaul Kit (P/N: 648.4708). It is recommended that this table be used to verify that all parts are present.

<b>PART #</b>	<b>NAME</b>	<b>QTY. (648.4708)</b>
SWA6A-400	Thrust Washer	1
SWA6A-1000	Wire Clamp Screw	4
SWA6A-1100	Upper DU Bearing	1
SWA6A-1200	Lower DU Bearing	1

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SWA6A-1300	Cylindrical Roller Thrust Bearing	1
SWA6A-1400	Circlip, Internal	1
SWA6A-1500A	Setscrew (.25 in.)	1
SWA6A-1500B	Setscrew (.50 in.)	1
SWA6A-1600	Decal, Up Arrow	1
SWA6A-1700	Decal, ID	1
SWA6A-1900	Female Spade Terminal (.250 in.)	12
SWA6A-2000	Female Spade Terminal (.125 in.)	4
SWA6A-2100	Wire - 14 Gauge 3 Wire	6 ft.

**Table 2.1 - Apical SWA6A Overhaul Kit Parts List**

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### **3 Disassembly**

These disassembly procedures are for the complete disassembly of the Swivel assembly.

**NOTE: The term 'Remove' implies the temporary separation and/or un-installation of parts which are then reused later in the overhaul. The term 'Discard' implies the permanent disposal of a part and is reserved only for components which have a replacement found in the Apical SWA6A Overhaul Kit.**

- 3.1 Using 3/32" stamps, copy the information from the existing (old) ID Decal to the new ID Decal (SWA6A-1700). Remove and discard the old ID Decal and Up Arrow Decal.
- 3.2 Remove and discard the four (4) Wire Clamp Screws (SWA6A-1000). Remove the two (2) Wire Clamps (SWA6A-700).
- 3.3 Using a soft punch, tap upwards on the Cover (SWA6A-1800) until it is fully disengaged from the Bearing Housing (SWA6A-300). Temporarily leave in place around the Upper End.
- 3.4 Clear away excess silicone as necessary and remove the Internal Circlip (SWA6A-1400) from the Bearing Housing groove. Temporarily leave in place around the Upper End.
- 3.5 Unthread the Upper End (SWA6A-200) from the Bearing Housing. Remove the Upper End (along with the Cover and Internal Circlip) by gently working and pushing the upper end wire back into the Upper End while simultaneously unthreading it.

The inner core should now be exposed with the top wires encased in silicone, still connected to the Rotary Contact (SWA6A-900).

Discard the Internal Circlip (SWA6A-1400).

- 3.6 Remove and discard the Upper DU Bearing (SWA6A-1100) from the Upper End.
- 3.7 Remove the Collar (SWA6A-600). Remove the two (2) Semi Rings (SWA6A-500).



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- 3.8 Remove the Bearing Housing Assembly by sliding it up and away from the Lower End (SWA6A-100) and over the inner core.
- 3.9 Remove and discard the Cylindrical Roller Thrust Bearing (SWA6A-1300) and Thrust Washer (SWA6A-400) from the Bearing Housing. Remove and discard the Lower DU Bearing (SWA6A-1200) from the Bearing Housing.
- 3.10 Remove and discard the Setscrew (SWA6A-1500) from the Lower End.
- 3.11 Remove the Lower End (SWA6A-100) by gently working and pushing the lower end wire back into the Lower End at the same time as pulling it apart.
- 3.12 Remove the Connector Bushing (SWA6A-800). The Rotary Contact should now be completely exposed with both the top and bottom wires still connected and encased in silicone.
- 3.10 Carefully remove the silicone coating from both ends of the Rotary Contact. Remove the upper and lower end wires; All Spade Terminals are removed as well. Carefully remove any excess silicone from the Rotary Contact.

For SWA6A-2 and SWA6A-3 model swivels proceed to Step 3.11.

For SWA6A-4, SWA6A-6, and SWA6A-8 model swivels skip to Step 3.12.

**CAUTION: When disassembled, the Rotary Contact must remain in the upright position whenever possible. The correct orientation is labeled on the exterior of the Rotary Contact.**

- 3.11 For SWA6A-2 and SWA6A-3 models, discard all wires and spade terminals removed in the previous step. Proceed to Section 4 - Cleaning.
- 3.12 For SWA6A-4, SWA6A-6, and SWA6A-8 model swivels, trim the wire ends that were previously coated in silicone (both upper and lower wires) so that they may be prepared for re-crimping later in the overhaul process. Discard all old/used Spade Terminals that were previously coated in silicone. Proceed to Section 4 - Cleaning.

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## 4 Cleaning

The Following cleaning instructions should be performed as described after completing Section 3. All dust, dirt, corrosion, rust and moisture must be removed, they will eventually cause the operational failure of the swivel.

### 4.1 General Cleaning Procedures

- 4.1.1 Clean all metal parts with parts washing solvent or equivalent. Remove caked on dirt with a stiff-bristle or non-metallic brush.

**CAUTION: Because the solenoid is an electric component, use only minimal amounts of solvent. Clean by hand and ensure that no water gets into the solenoid.**

- 4.1.2 Dry all parts thoroughly with a lint free cleaning cloth and blow off extra cleaning materials from hard to reach areas.
- 4.1.3 Ensure that all parts are free of rust, corrosion and abrasive matter. Remove minor surface corrosion, scratches and imperfections by polishing lightly with abrasive cloth.



## **5 Check and Inspection**

### **5.1 Parts Replacement**

**NOTE: This section is mandatory.**

Ensure that all applicable parts have been properly discarded (as per section 3) and replaced with the parts found in the Apical SWA6A Overhaul Kit.

### **5.2 Visual Inspection**

**NOTE: This section is mandatory.**

Visually inspect all parts for wear and tear. Any component showing excessive wear, abuse, cracks, corrosion, or damage must be removed and replaced before overhauling can resume. The following parts should be given special attention as outlined below.

#### **5.2.1 Rotary Contact**

The Rotary Contact should not have any broken or bent tabs. The wire connectors leading to the module should all be held on firmly. (Top and Bottom)

**CAUTION: The Rotary Contact is mercury based, if any has leaked out this would cause the unit to fail. The module should be properly disposed of through proper recycling or mercury recover programs. Apical will forward for you the spent module to a mercury recover facility. Wrap and package items in accordance with local, state and federal regulations. Please state on your paper work "For Recycling" and identify shipments with phone/fax numbers.**

### **5.3 Non Destructive Testing**

**NOTE: This section is mandatory.**

The following parts must be sent out for NDT (Non Destructive Testing) and replaced upon failure:

- Lower End (SWA6A-100)
- Upper End (SWA6A-200)
- Collar (SWA6A-600)
- Bearing Housing (SWA6A-300)
- Both Semi Rings (SWA6A-500)





## **6 Re-Assembly**

**NOTE: Ensure that all previous sections have been properly completed before beginning the re-assembly process outlined below.**

For SWA6A-2 model swivels, proceed to Section 6.1.

For SWA6A-3 model swivels, skip to Section 6.2.

For SWA6A-4 model swivels, skip to Section 6.3.

For SWA6A-6 model swivels, skip to Section 6.4.

For SWA6A-8 model swivels, skip to Section 6.5.

### **6.1 Electrical Preparation for Model SWA6A-2 Swivels**

6.1.1 From the Apical SWA6A Overhaul Kit, cut the 14 gauge wire (SWA6A-2100) into two (2), 3 ft. segments.

6.1.2 On one (1) end of both wires, prepare the internal black and white wires for crimping and install .25 in. Female Spade Connectors (SWA6A-1900). The green wire will not be used and should remain insulated.

**NOTE: These are the only four (4) Female Spade Connectors required for this overhaul. The remaining eight (8) .25 in. connectors (SWA6A-1900) and four (4) .125 in. connectors (SWA6A-2000) are considered extra and will not be used.**

6.1.3 Proceed to Section 6.6.

### **6.2 Electrical Preparation for Model SWA6A-3 Swivels**

6.2.1 From the Apical SWA6A Overhaul Kit, cut the 14 gauge wire (SWA6A-2100) into two (2), 3 ft. segments.

6.2.2 On one (1) end of both wires, prepare the black, white, and green internal wires for crimping and install .25 in. Female Spade Connectors (SWA6A-1900).



**NOTE: These are the only six (6) Female Spade Connectors required for this overhaul. The remaining six (6) .25 in. connectors (SWA6A-1900) and four (4) .125 in. connectors (SWA6A-2000) are considered extra and will not be used.**

6.2.3 Proceed to Section 6.6.

### **6.3 Electrical Preparation for Model SWA6A-4 Swivels**

6.3.1 Prepare the wire ends that were trimmed in Step 3.12 for crimping and install .125 in. Female Spade Connectors (SWA6A-2000) on both the green and red wires. Install .25 in. Female Spade Connectors (SWA6A-1900) on all remaining wires (white and brown).

**NOTE: These are the only eight (8) Female Spade Connectors required for this overhaul. The remaining eight (8) .25 in. connectors (SWA6A-1900) are considered extra and will not be used.**

6.3.2 Proceed to Section 6.6.

### **6.4 Electrical Preparation for Model SWA6A-6 Swivels**

6.4.1 Prepare the wire ends that were trimmed in Step 3.12 for crimping and install .125 in. Female Spade Connectors (SWA6A-2000) on both the green and red wires. Install .25 in. Female Spade Connectors (SWA6A-1900) on all remaining wires (white, yellow, orange, and brown).

**NOTE: These are the only twelve (12) Female Spade Connectors required for this overhaul. The remaining four (4) .25 in. connectors (SWA6A-1900) are considered extra and will not be used.**

6.4.2 Proceed to Section 6.6.

### **6.5 Electrical Preparation for Model SWA6A-8 Swivels**

6.5.1 Prepare the wire ends that were trimmed in Step 3.12 for crimping and install .125 in. Female Spade Connectors (SWA6A-2000) on both the green and red wires. Install .25 in. Female Spade Connectors (SWA6A-1900) on all remaining wires (white, black, orange, purple, blue, and yellow).



6.5.2 Proceed to Section 6.6.

## 6.6 Rotary Contact Preparation

- 6.6.1 Insert the Connector Bushing (SWA6A-800) onto the bottom end of the Rotary Contact (SWA6A-900). Ensure that the screw hole is pointing closest to the inside (center) of the Rotary Contact body.
- 6.6.2 On the top and bottom of the Rotary Contact (SWA6A-900), attach the two (2) wires with the .125 in. spade connectors to the two (2) 4 Amp terminals. Attach the remaining wires to the surrounding 30 Amp terminals.

**NOTE: Rotary Contact terminals are not assigned to a particular wire color, i.e., a white wire with a .25 in. spade connector may be connected to any 30 Amp terminal. However, it is essential that the color orientation selected on the top of the Rotary Contact be aligned to the color orientation on the bottom.**

Using an ohmmeter, check the wiring continuity to ensure proper color alignment between the upper and lower terminals.

- 6.6.3 After the wiring alignment has been checked and verified, install shrink tubing over each of the exposed terminal connections.
- 6.6.4 Apply silicone coating to the terminals on both the upper and lower ends of the Rotary Contact. Ensure that the silicone is applied in such a way that a water tight seal is created over all wires and terminals.
- 6.6.5 Allow the silicone to fully cure (up to 24 hours) and proceed to Section 6.4.

## 6.7 Housing Assembly Preparation

- 6.7.1 Press the Lower DU Bearing (SWA6A-1200) and Thrust Washer (SWA6A-400) into the Bearing Housing (SWA6A-300); Use Loctite retaining compound on the parts.

**NOTE: Ensure that the Lower DU Bearing is installed below flush from Thrust Bearing side. The Thrust Washer will bottom out on the lip of the Bearing Housing chamfer side out.**



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- 6.7.2 Generously load the Cylindrical Roller Thrust Bearing (SWA6A-1300) with grease and press the bottom side (side with the larger inside diameter) into the Bearing Housing. Apply additional grease to faying surfaces.

## **6.8 Parts Assembly**

- 6.8.1 Gently pull and work the bottom wire (end with Connector Bushing) through the Lower End (SWA6A-100) until Rotary Contact can be inserted into position in the Lower End. Align the set screw hole on the Lower End with the set screw hole on the Rotary Collar and install Setscrew (SWA6A-1500). Use Loctite threadlocker on Setscrew. Do not over tighten Setscrew.

**NOTE: For SWA6A-2, SWA6A-3, and SWA6A-4 model swivels use the .50 in. Setscrew (SWA6A-1500B). For SWA6A-6 and SWA6A-8 model swivels use the .25 in. Setscrew (SWA6A-1500A).**

- 6.8.2 Apply grease to the shaft of the Lower End and the Lower DU Bearing inside the Housing Assembly. Install the Housing Assembly by slipping it over and around the Lower End. Be sure to thread the upper end wires through the center of the Housing Assembly.

- 6.8.3 Apply grease to the two (2) Semi Rings (SWA6A-500) and fit them into place around the notch in the Lower End (SWA6A-100).

- 6.8.4 Apply grease to the Collar (SWA6A-600) and install it around the two (2) Semi Rings.

**NOTE: The Collar must be installed with the groove facing down.**

- 6.8.5 Press the Upper DU Bearing (SWA6A-1100) into the Upper End (SWA6A-200); Use Loctite retaining compound on the parts.

- 6.8.6 Place the Internal Circlip (SWA6A-1400) over and around the top of the Upper End (SWA6A-200). Next, place the Cover (SWA6A-1800) over and around the Upper End.

**NOTE: The intention is to set these components in place prior to feeding the wires through the Upper End hole. There will not be enough clearance once the wires are pulled into place.**



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- 6.8.7 Gently pull and work the top wire through the Upper End (SWA6A-100) while simultaneously threading it into the Bearing Housing; Use a generous amount of anti-seize on both threaded parts.
- 6.8.8 Once completely threaded, lightly grease the Internal Circlip and insert it into the groove along the inside of the Bearing Housing.
- 6.8.9 Apply silicone to the outer lip of the Cover (SWA6A-1800) and press into place on the top of the Bearing Housing. It is not necessary to wait for silicon to cure. Clean off any excess silicone and immediately proceed to the next step.
- 6.8.10 Ensure that the upper and lower wires have some slack by pushing the wires back into the Upper and Lower Ends until they go no further.
- 6.8.11 Apply silicon to the upper and lower wire openings (where the wires exit the swivel body) to seal the holes. It is not necessary to wait for silicon to cure. Immediately proceed to the next step.
- 6.8.12 Install upper and lower Wire Clamps (SWA6A-700) using the Wire Clamp Screws (SWA6A-1000). Use silicon on the threads.
- 6.8.13 Install the ID Decal (SWA6A-1700) on the center of the Bearing Housing and on the opposite side from the Upper End Wire Clamp. Install the Up Arrow Decal (SWA6A-1600) on the Upper End above the ID Decal and above the flats for the shackle.

**NOTE: ID Decal should already have swivel information stamped on it from step 3.1 before installing.**

- 6.8.14 Apply label protection tape over both decals to create a clean, water tight seal.

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## **7 Assembly Inspection, Testing, and Checkout**

This section provides information and procedures required for operational checkout, testing and troubleshooting.

The following special items are required:

- i. DC Power Supply
  - a. Specification: NFB Filtered DC Power Supply; Range: 0-32 Volts

**NOTE: All test procedures in this section are mandatory. If testing cannot be completed as specified on site, the swivel may be sent out to an approved facility for testing.**

### **7.1 Operational Checkout**

Install swivel into load cell.

**A properly functioning swivel must be able to rotate freely and smoothly when a load of 6,000 lbs is applied.**

### **7.2 Operational Load Test**

After the swivel has demonstrated the ability to function properly under a 6,000 lb load (as per section 7.1), a series of operational load tests must be performed. Install the swivel into load cell and conduct the tests shown below in Table 7.1. All tests must successfully pass.



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# Of Cycles	Load (Lbs.)	Action	Pass/Fail
1	6,000	Check for conductivity against all wires.	
1	6,000	Check all wires for grounding against swivel body.	
1	3,000	Check for conductivity against all wires.	
1	3,000	Check all wires for grounding against swivel body.	
1	1,500	Check for conductivity against all wires.	
1	1,500	Check all wires for grounding against swivel body.	
1	0	Check for conductivity against all wires.	
1	0	Check all wires for grounding against swivel body.	

**Table 7.1 - Test Sheet**

### 7.3 Troubleshooting

Refer to Table 7.2 below for test related troubleshooting procedures.

Symptom	Probable Cause	Resolution
Wire not conductive	Loose Wire	Open unit up and reattach wire.
	Low Battery in Ohmmeter	Change Battery
Wires ground to Swivel body	Wire touching body	Open unit up. Ensure unused wires are trimmed to appropriate length and not contacting body.
		Ensure unit is properly deburred. Swivel wire may be cut and causing ground.
Wires not conductive with matching wire on opposite end of swivel	Crossed wires at Rotary Contact	Open unit up and check that terminals are attached in accordance with correct Assembly Sequence (Section 6.1, 6.2, 6.3, 6.4, or 6.5)

**Table 7.2 - Troubleshooting**

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## Appendix I: Complete Assembly Parts List

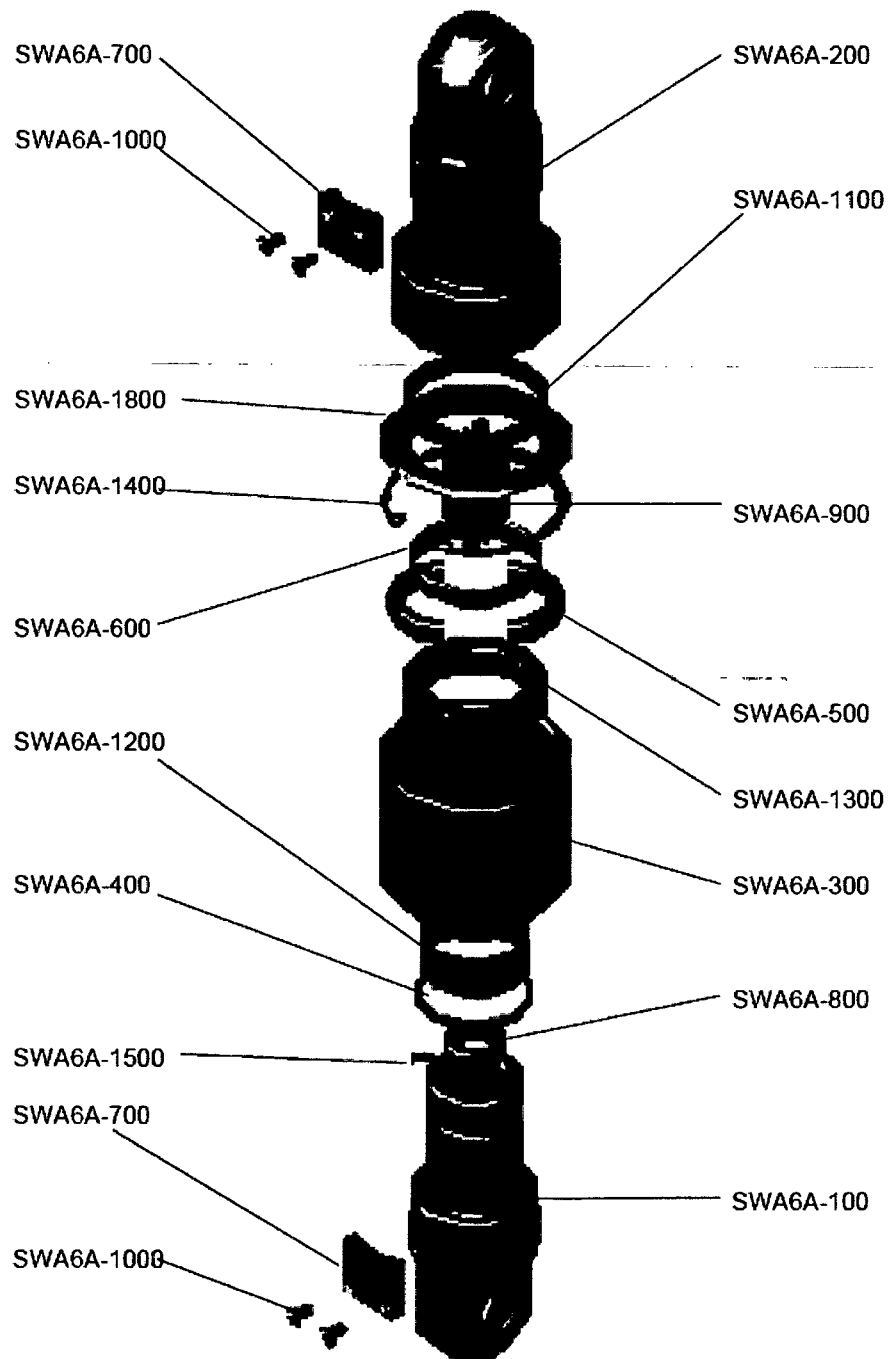
PART#	NAME	QTY. (Assembly)
SWA6A-100	Lower End	1
SWA6A-200	Upper End	1
SWA6A-300	Bearing Housing	1
SWA6A-400	Thrust Washer	1
SWA6A-500	Semi Rings	2
SWA6A-600	Collar	1
SWA6A-700	Wire Clamp	2
SWA6A-800	Connector Bushing	1
SWA6A-900	Rotary Contact	1
SWA6A-1000	Wire Clamp Screw	4
SWA6A-1100	Upper DU Bearing	1
SWA6A-1200	Lower DU Bearing	1
SWA6A-1300	Cylindrical Roller Thrust Bearing	1
SWA6A-1400	Circlip, Internal	1
SWA6A-1500	Set Screw	1
SWA6A-1600	UP Decal	1
SWA6A-1700	ID Decal	1
SWA6A-1800	Cover	1
SWA6A-1900	Female Spade Terminal (.25 in.)	Varies
SWA6A-2000	Female Spade Terminal (.125 in.)	Varies
SWA6A-2100	Wire	6 ft.

**Table A.1 - Complete Assembly Parts List**

PROPRIETARY



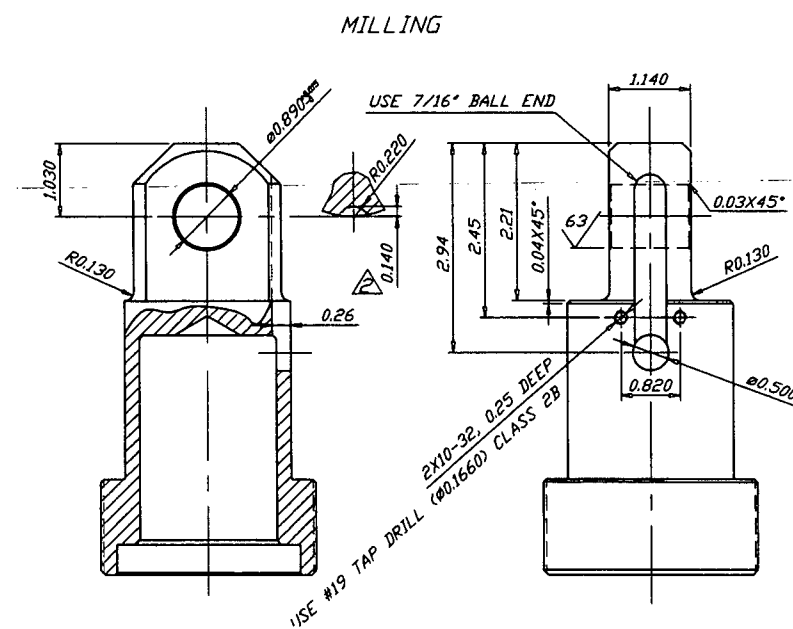
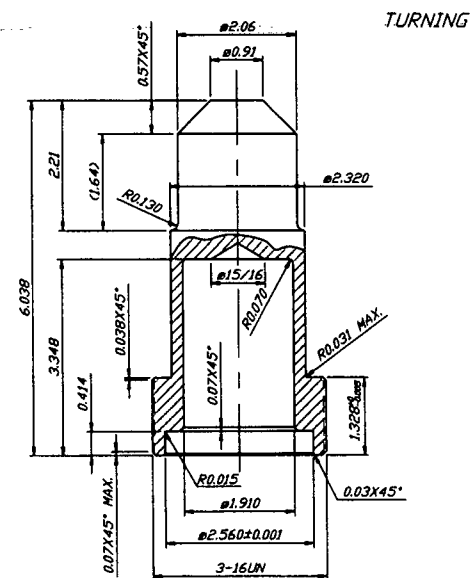
## Appendix II: Assembly Figures



**Figure A.1 - Assembly Overview**

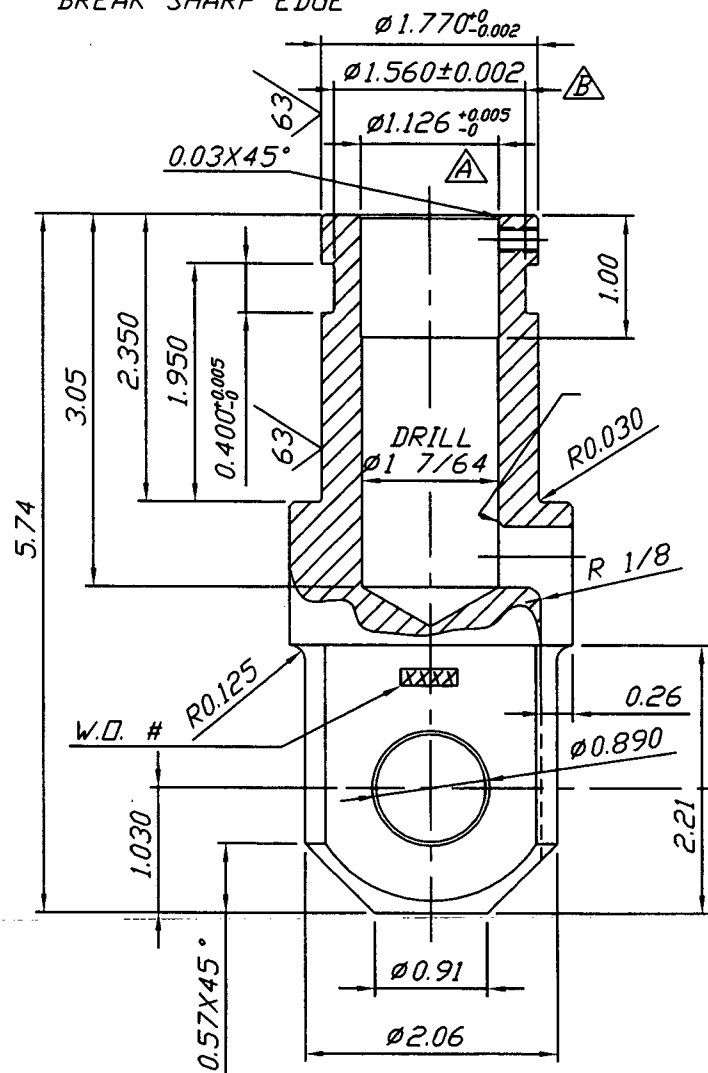
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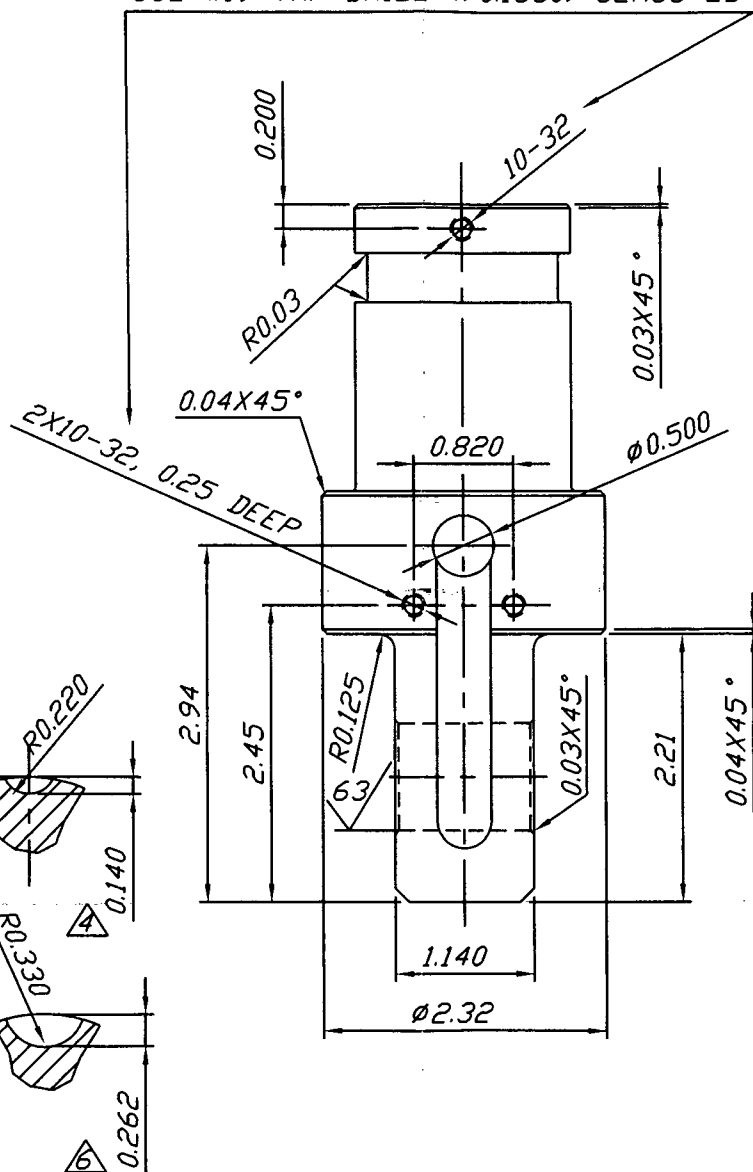
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A	TAP DRILL NOTE ADDED	Feb.17,03. CAK	Fraction .x .xx .xxx Holes	+/- 1/64 +/- .015 +/- .010 +/- .005 + .010 - .000	NOTE: All dimensions are in inch unless specified. Break all sharp edges.	THIS DRAWING IS THE PROPERTY OF CANAM AND MUST BE RETURNED TO CANAM ON REQUEST. ITS CONTENTS ARE SECRET AND CONFIDENTIAL ANY INFORMATION OBTAINED BY INSPECTION OF THE DRAWING SHALL NOT BE USED FOR ANY OTHER THAN THE SPECIFIC PURPOSE FOR WHICH ITS SPECIFICATION IS AUTHORIZED BY CANAM	DRAWN: CSABA A. KODOR	DATE: Jan.31.02	CHECKED BY:	DISK No:	PROJECT No: Jan.31.02	MATERIAL: SS17-4, H1150								FINISH:
B	WIRE SLOT DEPTH ADDED	Oct.12,04. CAK																		
C																				
D																				
E																				

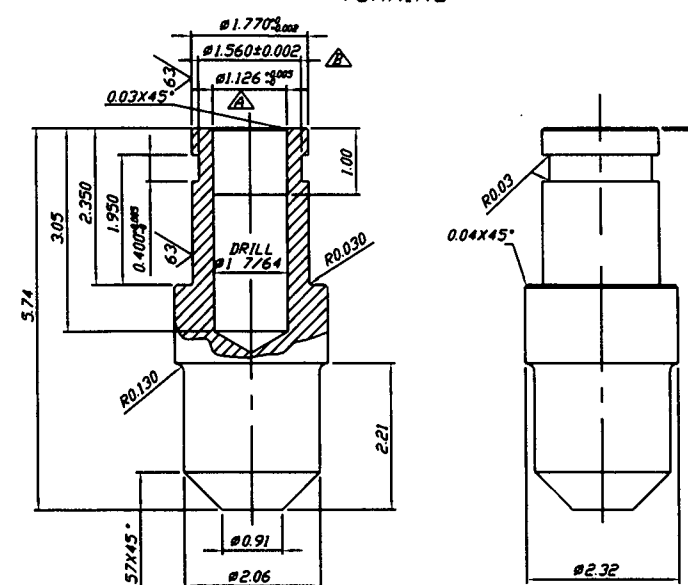
BREAK SHARP EDGE



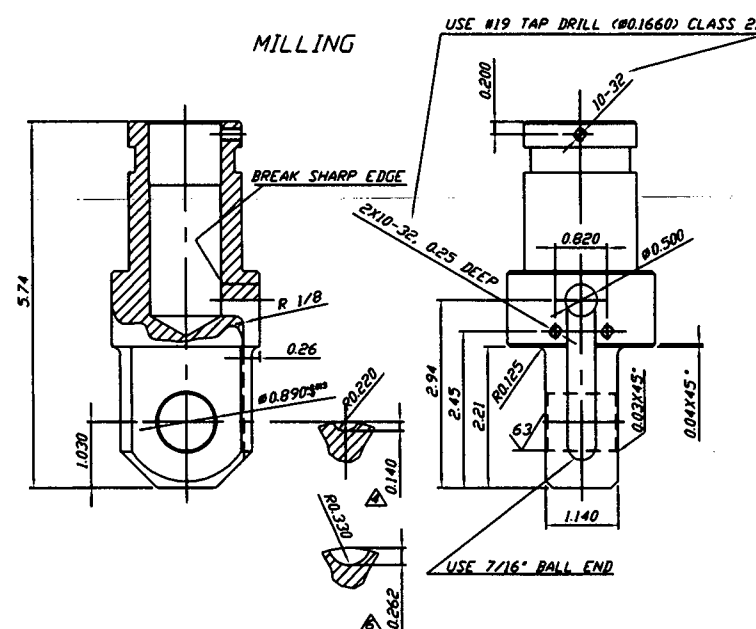
USE #19 TAP DRILL (0.1660) CLASS 2B



TURNING



MILLING



UNINCORPORATED ECN(s)

02311, 02560,

# REVISION

A	BORE DIMENSION CHANGED	Feb.11.02.	CAK
B	TIGHTENED TOLERANCE	Jul.17.02.	CAK
C	TAP DRILL NOTE ADDED	Feb.17.03.	CAK
D	DEPTH OF WIRE SLOT ADDED	Oct.12.04.	CAK
E	DRAWING NO. CHANGED	Oct.05.05	VH
F	W.O. # INDICATION IS ADDED	Jan.03.06	VH

# TOLERANCES

Fraction	+/- 1/64
.x	+/- .015
.xx	+/- .010
.xxx	+/- .005
Holes	+ 0.010 - 0.000

NOTE: All dimensions are in inch unless specified. Break all sharp edges.

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DRAWN BY:	CSABA A. KODOR	DATE:	Feb.01.02
CHECKED BY:		DISK No:	
APPROVED BY:		PROJECT No:	Feb.01.02

CANAM

MATERIAL: SS17-4, H1150

LOWER END  
SWA-6A SWIVEL

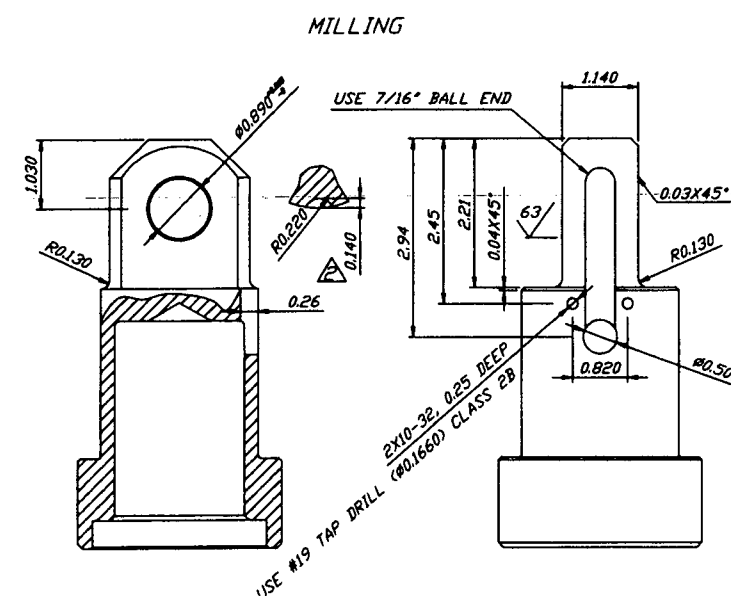
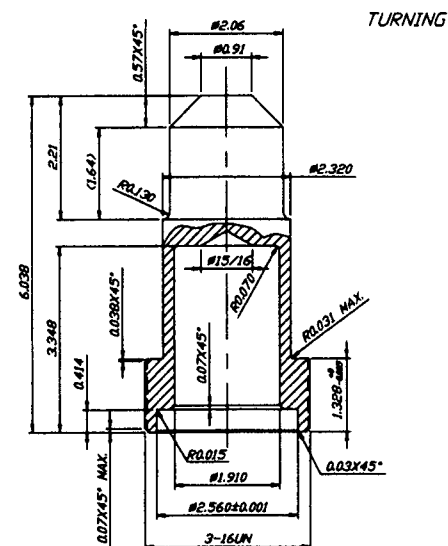
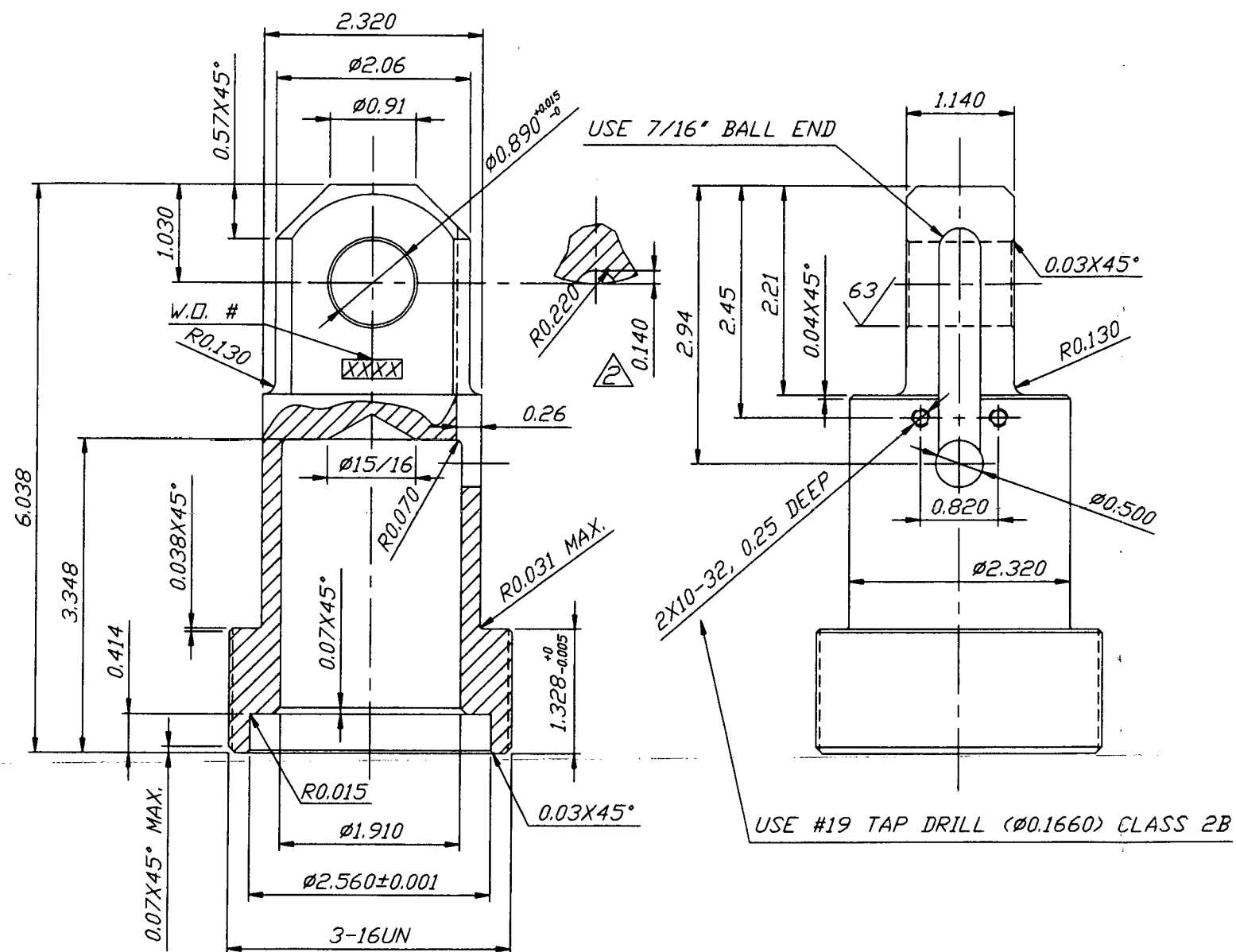
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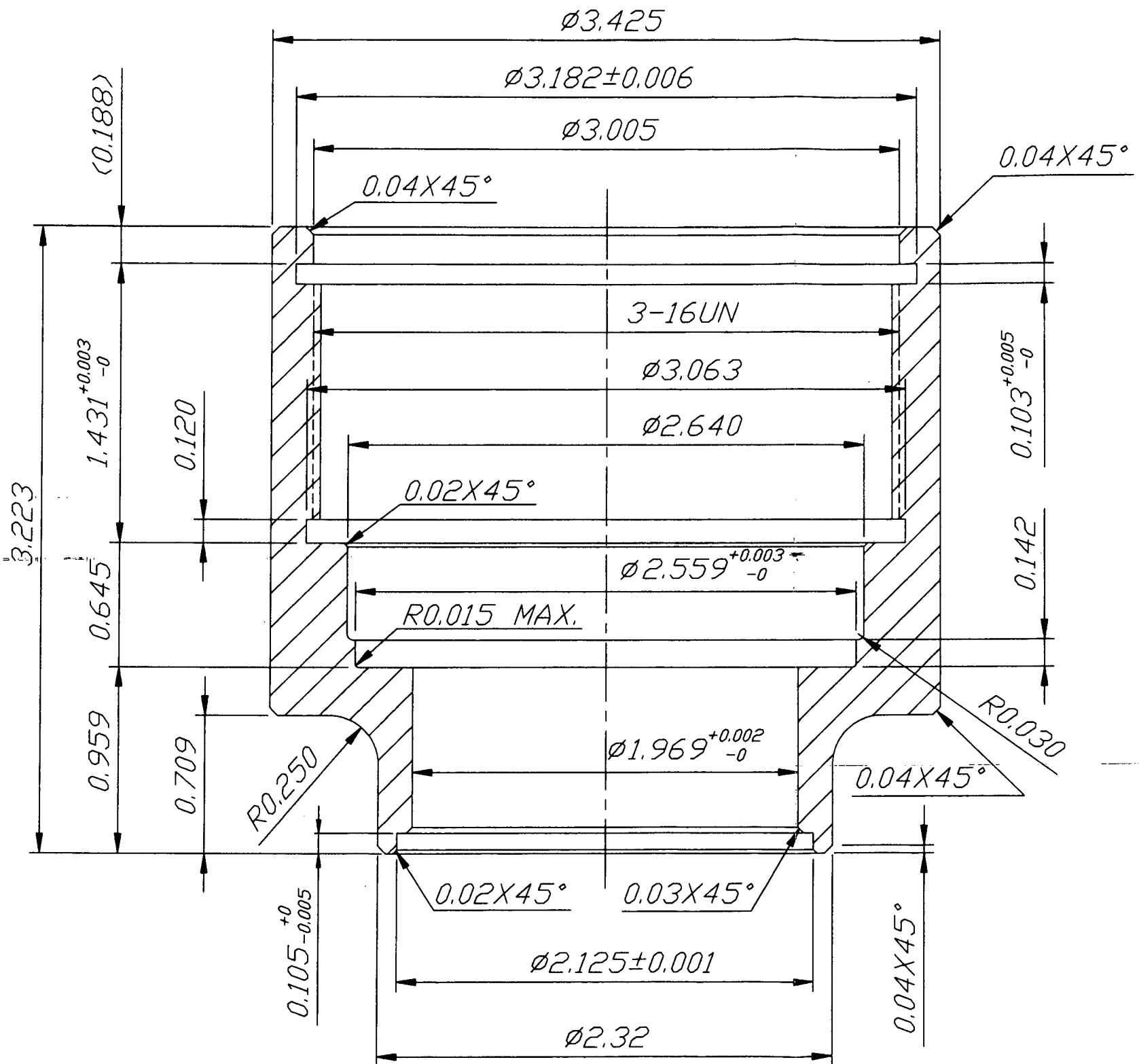
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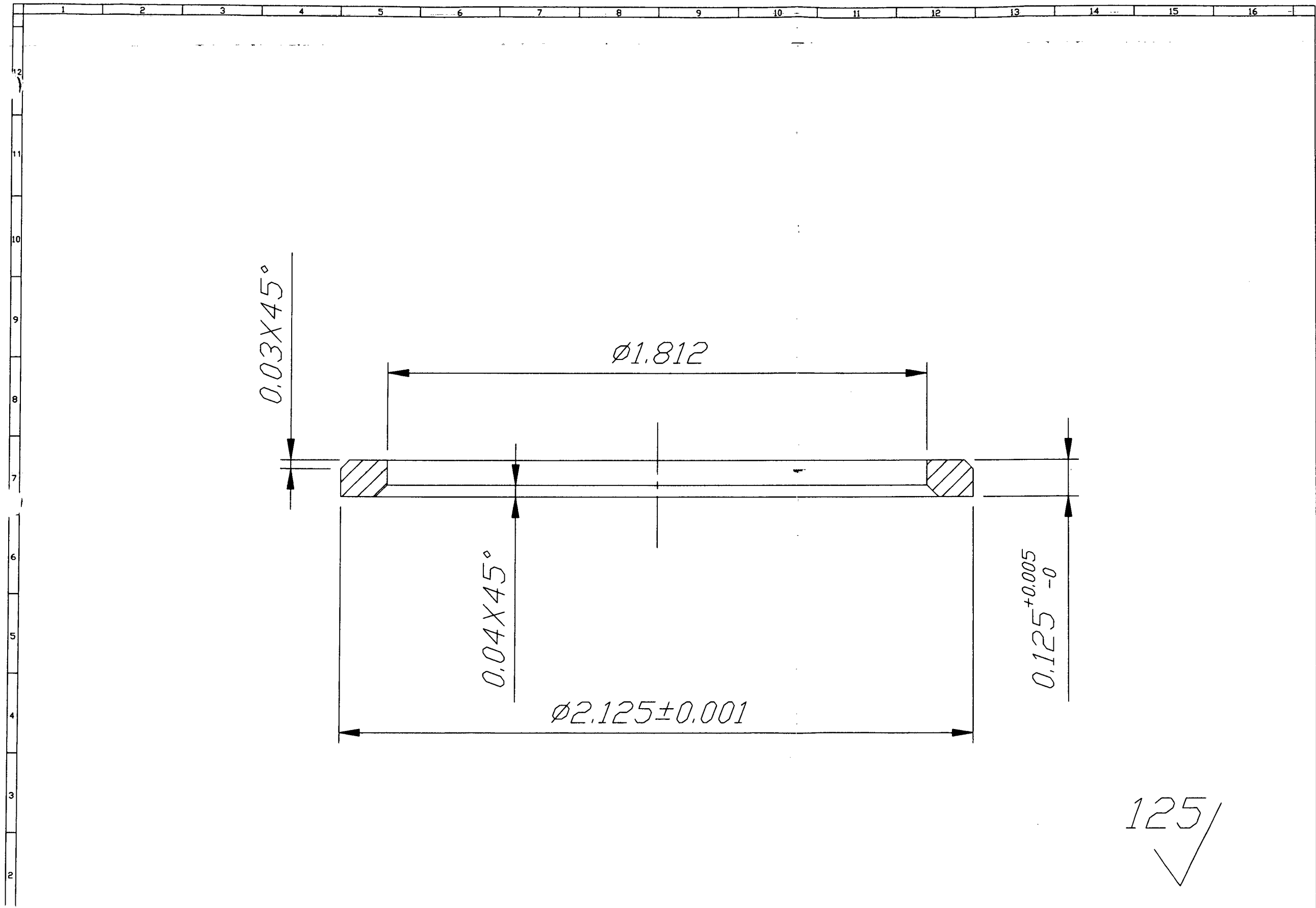


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<div>A TAP DRILL NOTE ADDED Feb.17.03. CAK</div>				<div>Fraction +/- 1/64</div>		<div>THIS DRAWING IS THE PROPERTY OF CANAM AND MUST BE RETURNED TO CANAM ON REQUEST. ITS CONTENTS ARE SECRET AND CONFIDENTIAL ANY INFORMATION OBTAINED BY INSPECTION OF THE DRAWING SHALL NOT BE USED FOR ANY OTHER THAN THE SPECIFIC PURPOSE FOR WHICH ITS SPECIFICATION IS AUTHORIZED BY CANAM</div>		<div>DRAWN CSABA A. KODOR</div>		<div>DATE Jan.31.02</div>		<div>MATERIAL SS17-4, H1150</div>		<div>FINISH</div>		<div>PART No. SWA6A_200</div>		<div>DRAWING No. SWA6A_200</div>		<div>QUANTITY: 1</div>		<div>REV. 4</div>					
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D				.xxx	+/- .005			APPROVED BY:	PROJECT No								
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E																	





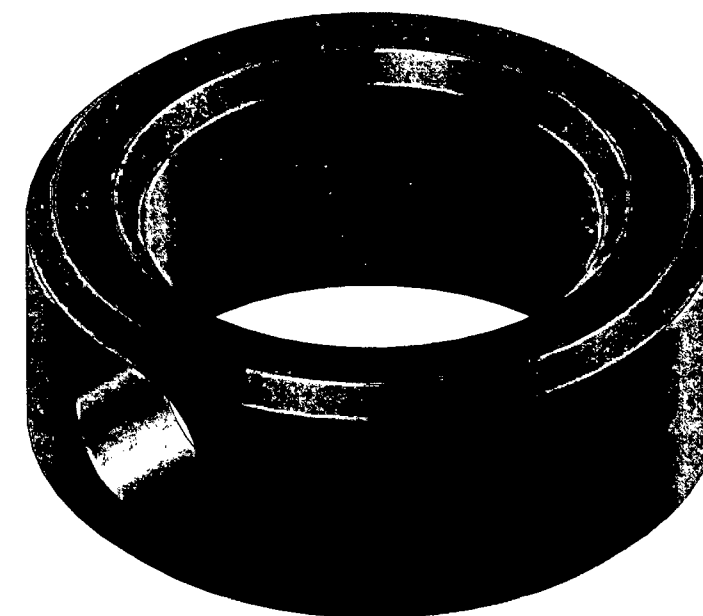
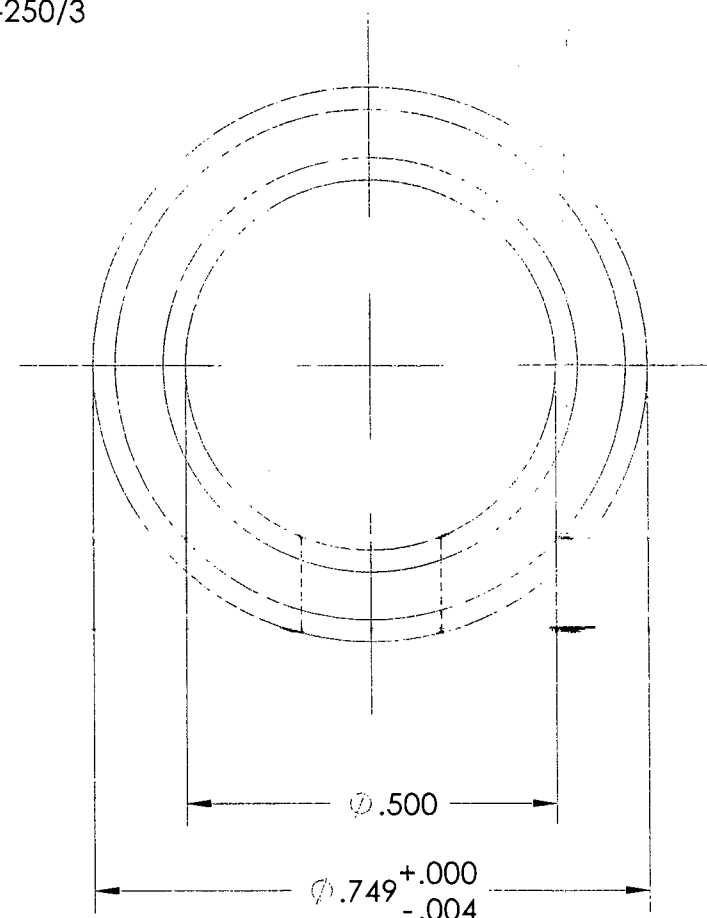
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B				.x	+/- .015		NOTE: All dimensions are in inch unless specified. Break all sharp edges.  THIS DRAWING IS THE PROPERTY OF CANAM AND MUST BE RETURNED TO CANAM ON REQUEST. ITS CONTENTS ARE SECRET AND CONFIDENTIAL ANY INFORMATION OBTAINED BY INSPECTION OF THE DRAWING SHALL NOT BE USED FOR ANY OTHER THAN THE SPECIFIC PURPOSE FOR WHICH ITS SPECIFICATION IS AUTHORIZED BY CANAM	DATE	Feb.04,02	MATERIAL	FINISH	PART No.	DRAWING No.	QUANTITY: 1	REV.				
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D				.xxx	+/- .005			APPROVED BY:	PROJECT No.										
E				Holes	+ 0.010 0.000														
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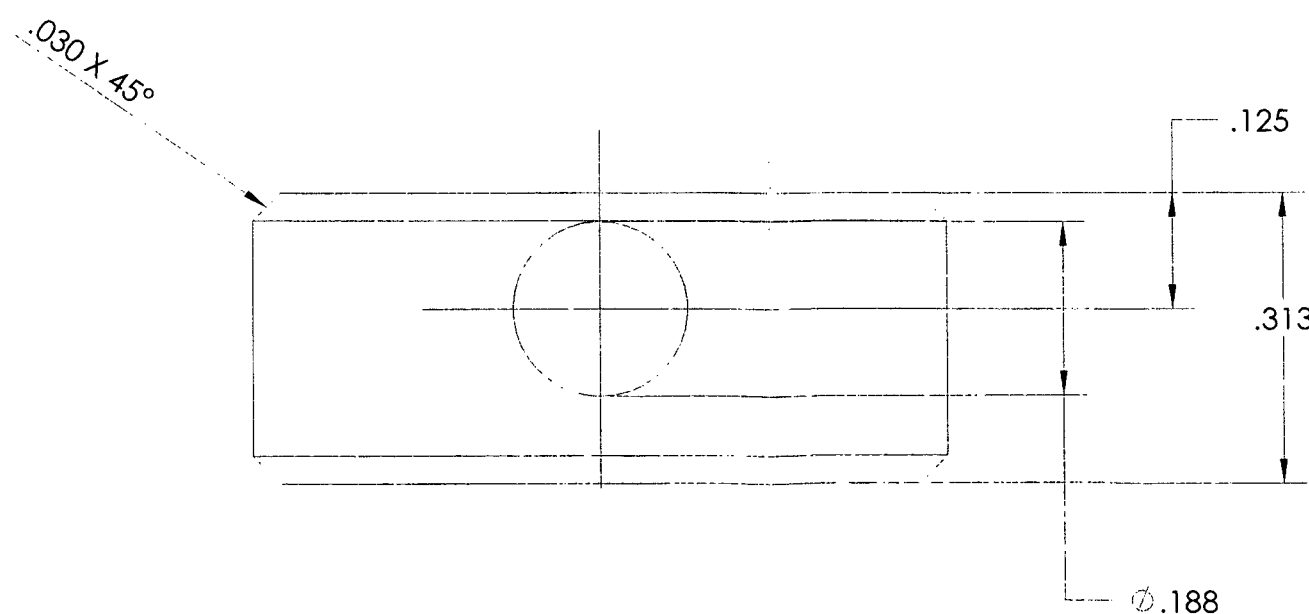
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NC	INCORPORATED ECN 02947	07/27/10	P.BRAVO

NOTE:

1. MATERIAL: 6061-T6 ALUMINUM IAW AMS-QQ-A-250/3
2. ANODIZE IAW MIL-A-8625 TYPE 3 CLASS 1



SWA3-500A

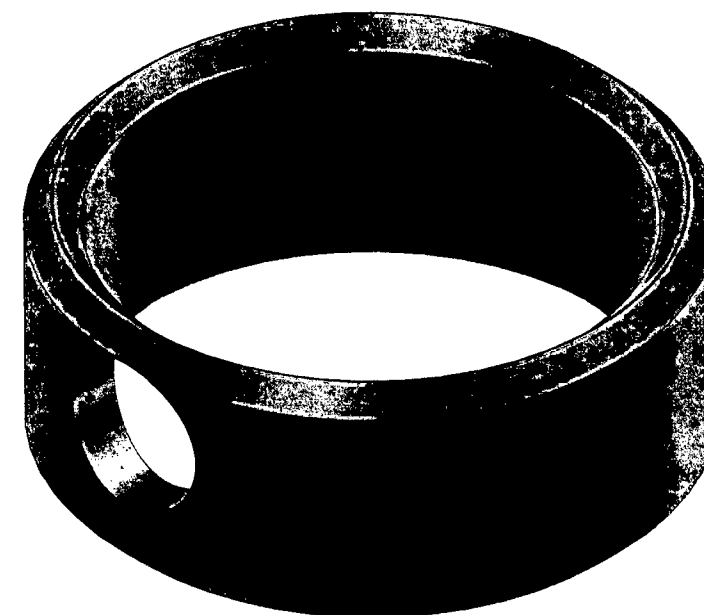
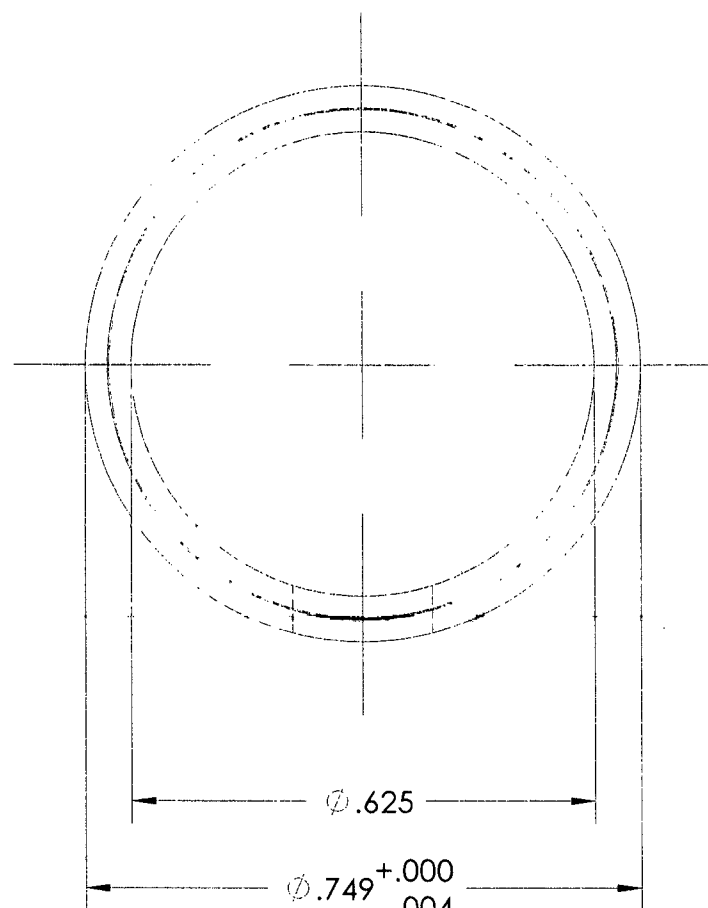


500B	500A	FIND #	PART #	DESCRIPTION	MAT'L	SPEC.
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			SWA3-500A	SPACER	1	2
QTY				PARTS LIST		
NEXT ASSY (S)				ORIGINAL DATE (MO-DA-YR) 07-16-97		
				DRAWN BY ZOLTAN BANYI		
				CHECKER A.KODOR		
				DRAWING APPROVAL A.KODOR		
				07/16/97		
				CONTRACT No.		
				UNLESS OTHERWISE SPECIFIED		
				DIMENSIONS ARE IN INCHES		
				TOLERANCES ARE:		
				2 PLACE DECIMALS $\pm .010$		
				3 PLACE DECIMALS $\pm .005$		
				ANGLES $\pm .5^\circ$		
				APICAL INDUSTRIES		
				2608 TEMPLE HEIGHTS DR.		
				OCEANSIDE, CA. 92056-3512 (760)724-5300		
				CONTACT SPACER		
				SWA-3 SWIVEL		
				SIZE B		
				CAGE CODE 07M26		
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				SCALE NONE		
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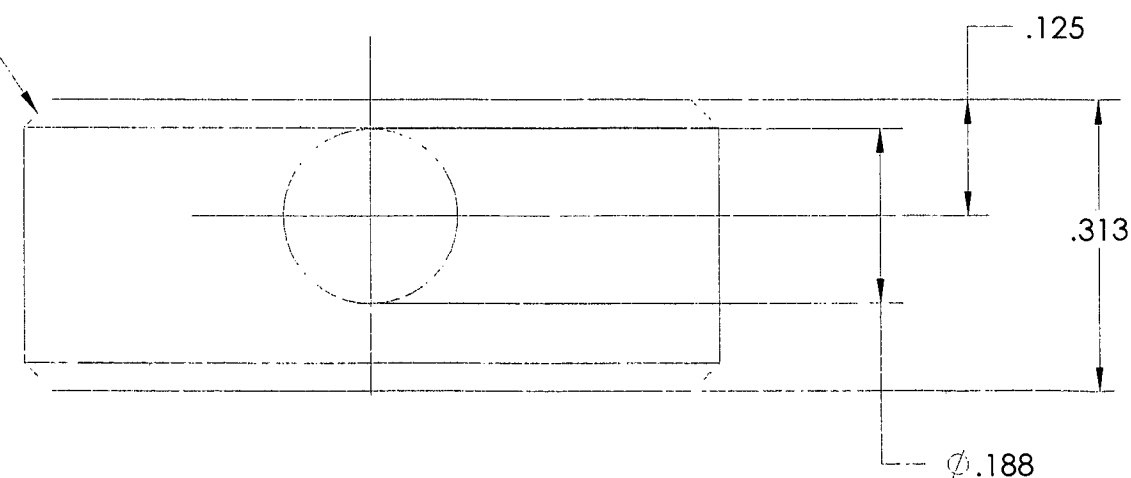
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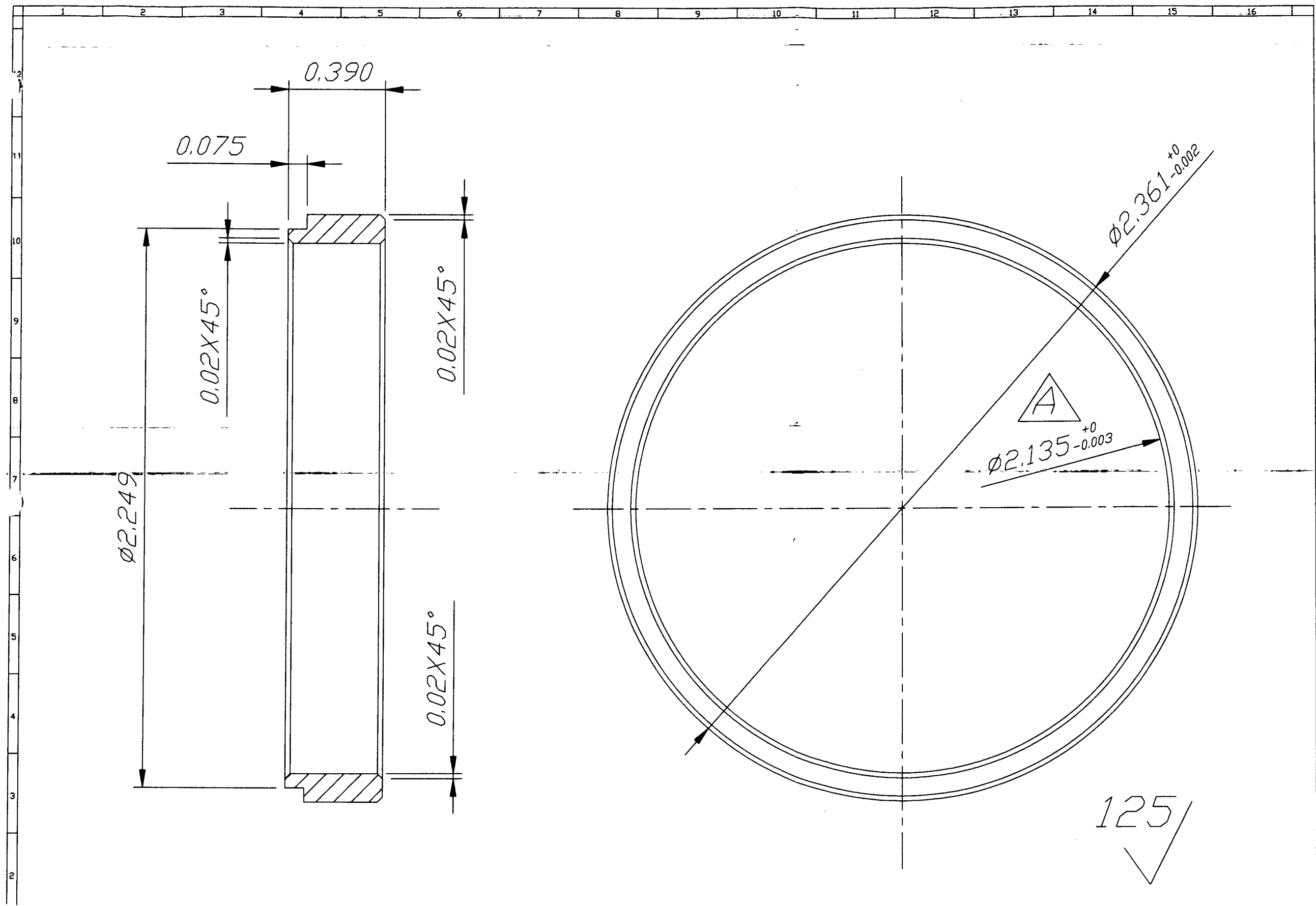


SWA3-500B

.030 X 45° TYP



QTY		PARTS LIST			
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	DRAWN BY ZOLTAN				
	CHECKER				
	DRAWING APPROVAL	<b>CONTACT SPACER SWA-3 SWIVEL</b>			
	CONTRACT No.				
	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: 2 PLACE DECIMALS ±.010 3 PLACE DECIMALS ±.005 ANGLES ±.5°	SIZE B	CAGE CODE 07M26	DWG. NO. <b>SWA3-500</b>	REV. N/C
		SCALE NONE		SHEET 2 OF 2	



REVISION				TOLERANCES		IMPORTANT	DESIGNED: CANAM		SCALE: NTS		COLLAR		SWA6A SWIVEL				
A	TIGHTENED TOLERANCES	Jul.17.02.	CAK	Fraction	+/- 1/64	NOTE: All dimensions are in inch unless specified. Break all sharp edges.	THIS DRAWING IS THE PROPERTY OF CANAM AND MUST BE RETURNED TO CANAM ON REQUEST. ITS CONTENTS ARE SECRET AND CONFIDENTIAL ANY INFORMATION OBTAINED BY INSPECTION OF THE DRAWING SHALL NOT BE USED FOR ANY OTHER THAN THE SPECIFIC PURPOSE FOR WHICH ITS SPECIFICATION IS AUTHORIZED BY CANAM	DRAWN: CSABA A. KODOR	DATE: Feb.04.02	CHECKED BY:	DISK No	MATERIAL: 17-4, H 1150	FINISH:	PART No: SWA6A_600	DRAWING No: SWA6A_600	REV. 2	
B	DRAWING NO. CHANGED	Oct.06.05	VH	.x	+/- .015												QUANTITY: 1
C				.xx	+/- .010												
D				.xxx	+/- .005												
E				Holes	+ 0.010 - 0.005												

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# NOTES :

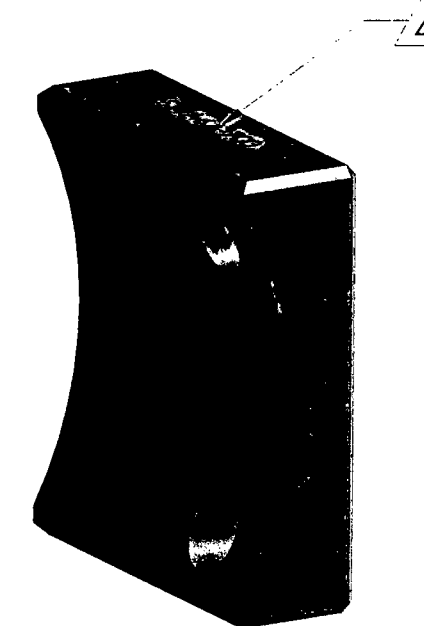
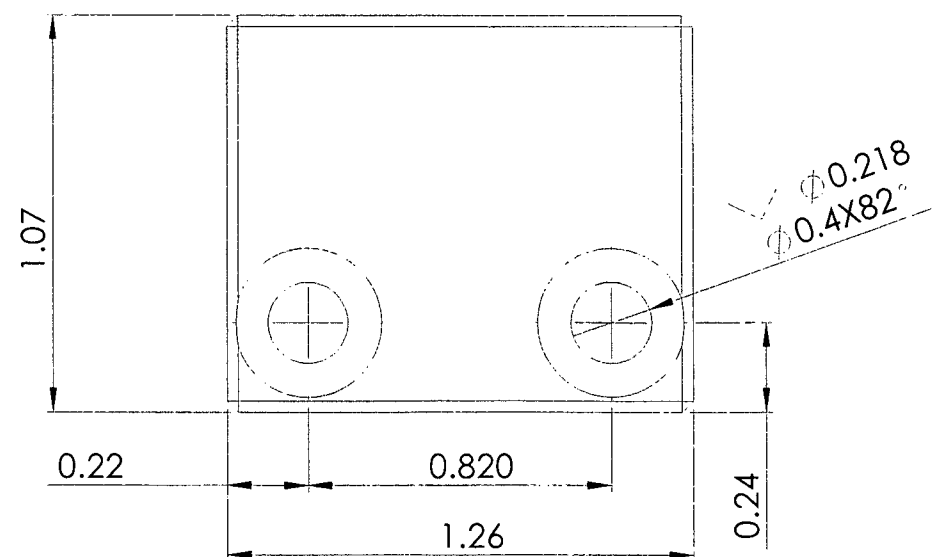
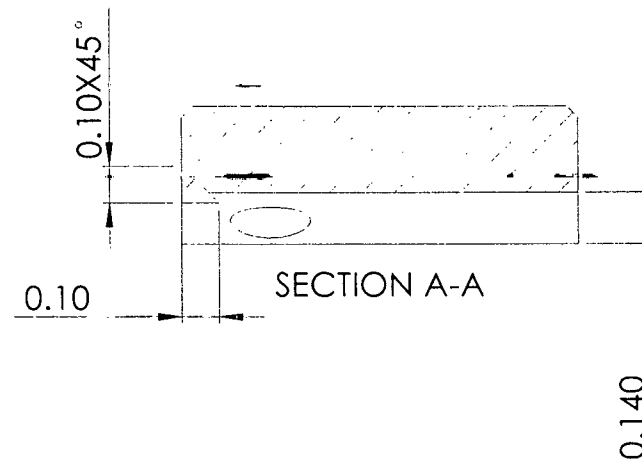
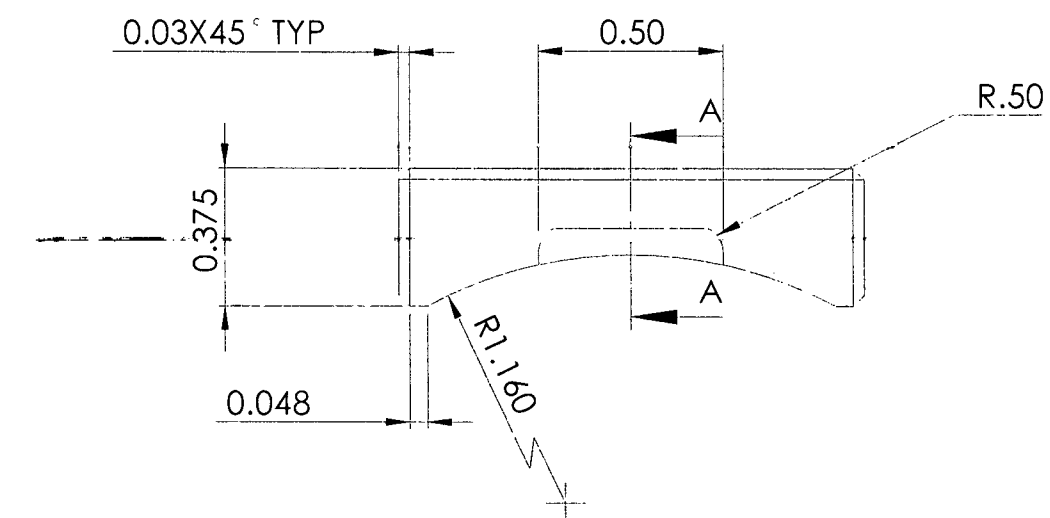
1. IDENTIFY IAW MPP-120. LASER ENGRAVE

2 MATERIAL : AL 6061-T6 IAW AMS-QQ-A-250/11

3 FINISH : HARD ANODIZE, MIL-A-8625 TYPE 3  
CLASS 2 COLOR BLACK

4 LASER ENGRAVE P/N, FONT HEIGHT .063

5. BREAK ALL SHARP EDGES

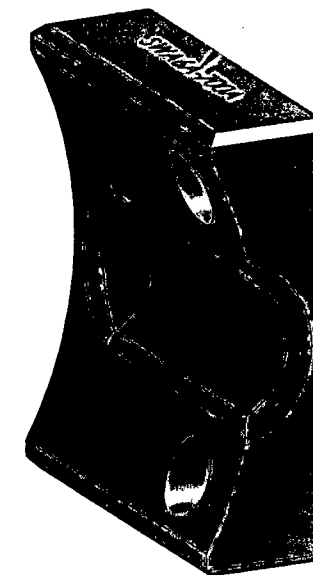


SWA6A-700

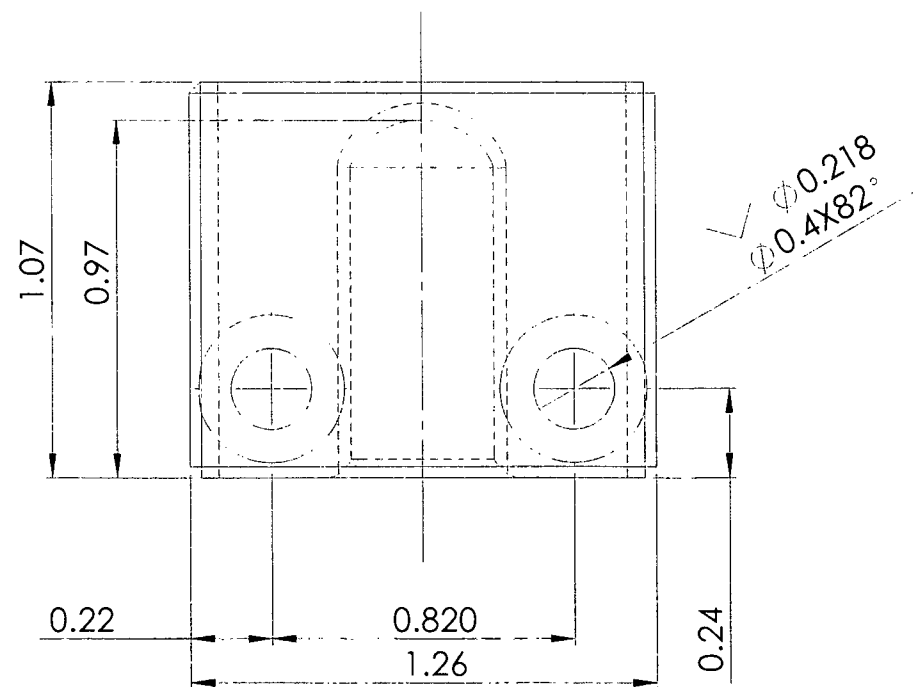
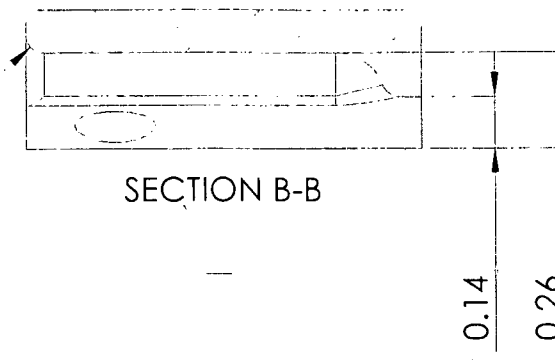
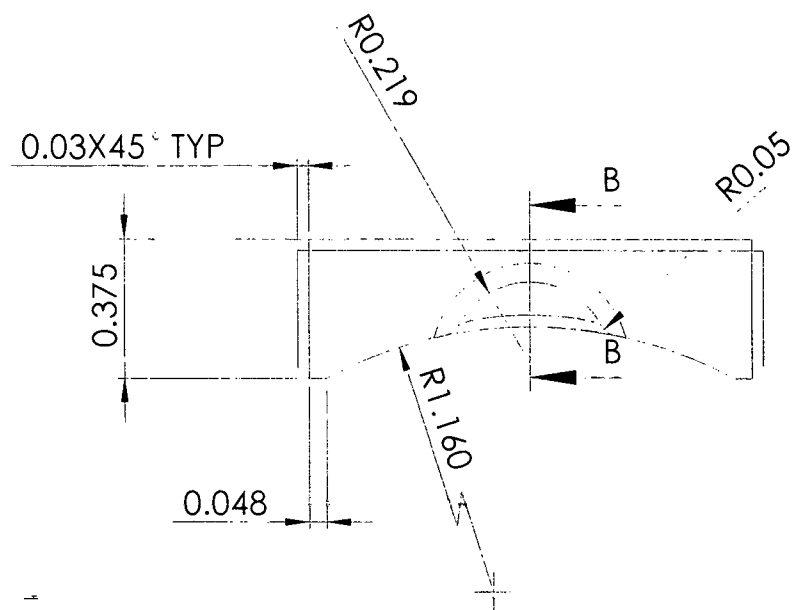
	X		2	SWA6A-700A	WIRE CLAMP	2	3
		X	1	SWA6A-700	WIRE CLAMP	2	3
	-700A	-700	FIND #	PART #	DESCRIPTION	MAT'L	SPEC.
QTY			PARTS LIST				
NEXT ASSY (S)			APICAL INDUSTRIES				
SWA6A			2608 TEMPLE HEIGHTS DR. OCEANSIDE, CA. 92056-3512 (760)724-53				
			WIRE CLAMP				
			SWA60 SWIVEL				
			SIZE CAGE CODE DWG. NO. REV.				
			B 07M76 SWA6A-700 N/A				
			SCALE NONE				SHEET 1 OF 2
			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: 2 PLACE DECIMALS ± .010 3 PLACE DECIMALS ± .005 ANGLES ± .5°				

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4



SWA6A-700A



ORIGINAL DATE (MO-DA-YR) 02-19-02		APICAL INDUSTRIES 2608 TEMPLE HEIGHTS DR. OCEANSIDE, CA. 92056-3512 (760)724-5300	
DRAWN BY C.KODOR	CHECKER CAK		
DRAWING APPROVAL CAK 02-19-02 CONTRACT NO.			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: 2 PLACE DECIMALS ±.010 3 PLACE DECIMALS ±.005 ANGLES ±.5		WIRE CLAMP SWA6A SWIVEL	
		SIZE B	REV. N/C
		CAGE CODE 07M26	DWG. NO. SWA6A-700
		SCALE NONE	
		SHEET 2 OF 2	

1 2 3 4 5 6 7 8

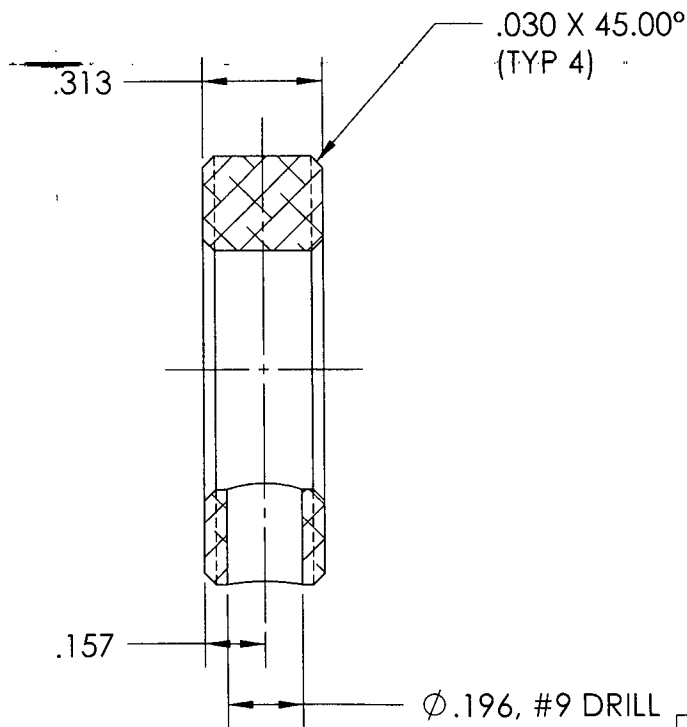
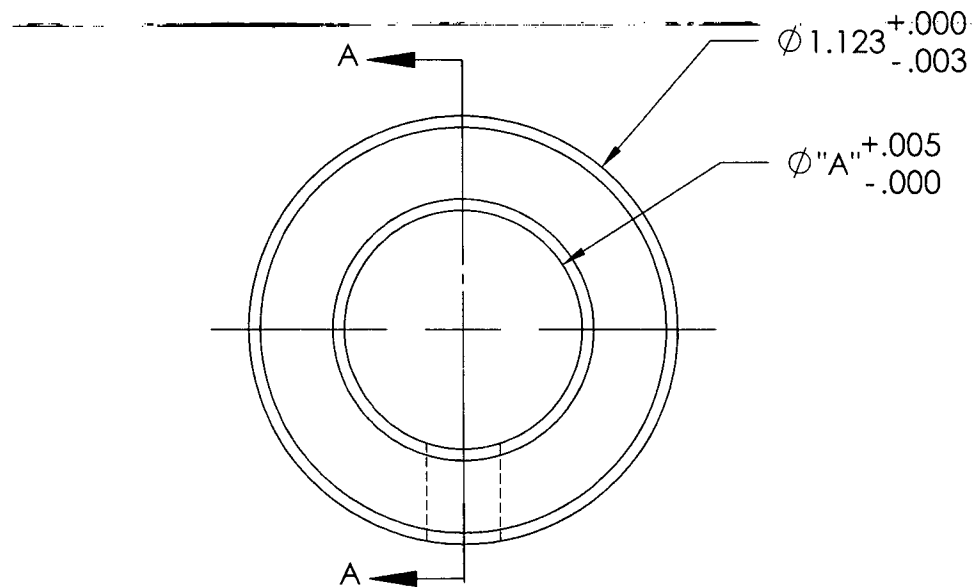
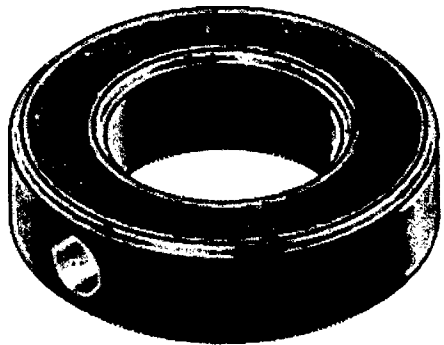
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF APICAL INDUSTRIES. ANY REPRODUCTION IN PART OR WHOLE WITHOUT THE WRITTEN PERMISSION OF APICAL INDUSTRIES IS PROHIBITED.

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
4	LAST CANAM REVISION	02-19-02	CAK
N/C	INCORPORATED ECN 02916	07-06-10	P.BRAVO

NOTES:

- 1 MATERIAL: 6061-T6 ALUMINIUM ALLOY
2. DEBURR AND BREAK ALL SHARP EDGES
- 3 FINISH: HARD ANODIZED IAW MIL-A-8625 TYPE 3, CLASS 1, COLOR CLEAR
4. DIMENSIONS VALID AFTER APPLYING FINISH

"A"	PART NUMBER	FITS CONNECTOR(S)
0.499	SWA6A-800A	#230, #331
0.625	SWA6A-800B	#330, #430
0.874	SWA6A-800C	#630

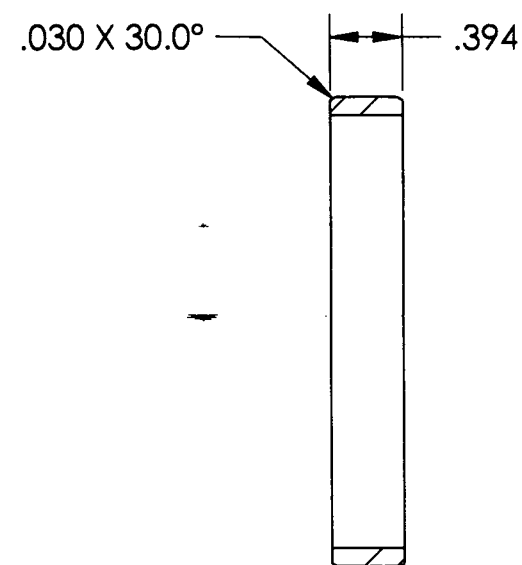
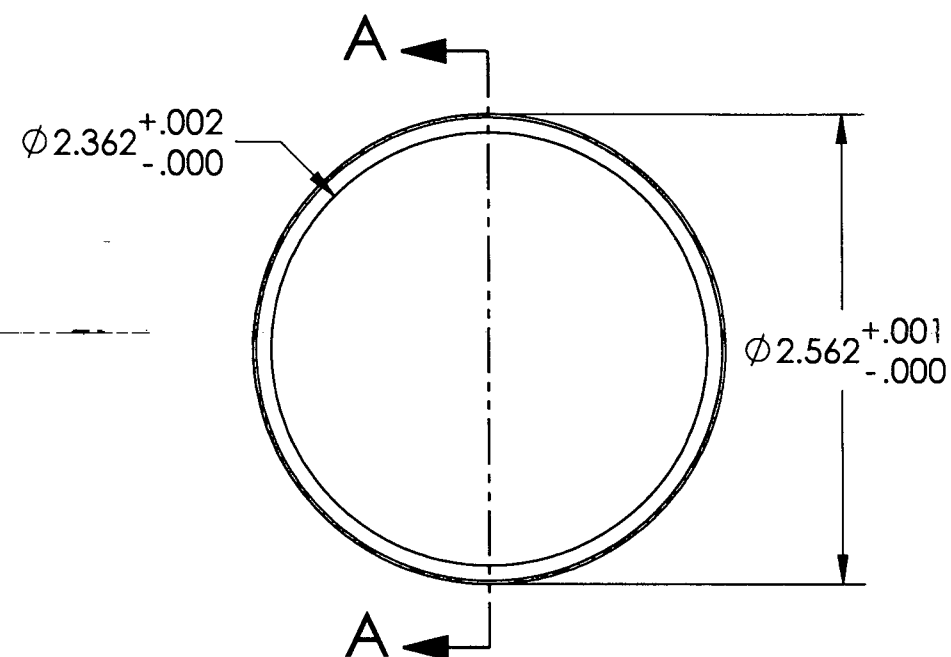


SECTION A-A

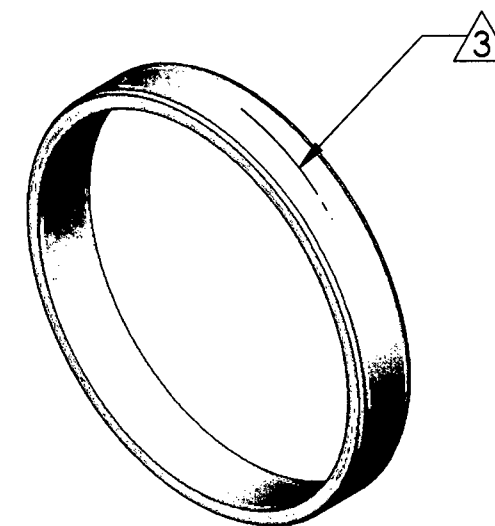
		SWA6A-800 A	CONNECTOR BUSHING	△	△
		SWA6A-800 B	CONNECTOR BUSHING	△	△
		SWA6A-800 C	CONNECTOR BUSHING	△	△
	FIND NO.	PART NO.	DESCRIPTION	MAT'L	SPEC
QTY	PARTS LIST				
NEXT ASSY (S)	ORIGINAL DATE (MO-DA-YR)	02-19-02	<b>APICAL INDUSTRIES</b> 2608 TEMPLE HEIGHTS DR. OCEANSIDE, CA. 92056-3512 (760)724-5300		
	DRAWN BY	C. A. KODOR			
	CHECKER	C. A. KODOR			
	DRAWING APPROVAL	C. A. KODOR			
	CONTRACT NO.		<b>CONNECTOR BUSHING</b>		
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: 2 PLACE DECIMALS ± .010 3 PLACE DECIMALS ± .005 ANGLES ± .5°			SIZE	CAGE CODE	DWG. NO.
			B	07M26	SWA6A-800
			SCALE	NONE	SHEET 1 OF 1

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APICAL INDUSTRIES ANY REPRODUCTION IN PART OR WHOLE WITHOUT  
THE WRITTEN PERMISSION OF APICAL INDUSTRIES IS PROHIBITED.

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
1	LAST CANAM REVISION	04/03/02	CAK
N/C	INCORPORATED ECN 02870	05/20/10	PB 23



SECTION A-A



SWA6A\_1100

**UNINCORPORATED ECN(s)**

03017

NOTES :

1. MATERIAL : BRONZE / OILITE TUBING, MIL - B-5687D GRADE I OR EQUIVALENT.
2. IDENTIFY IAW MPP-120.

**3** LASER ENGRAVE CENTURY GOTHIC 12 POINT ,  
P/N AND REVISION.

X	1	SWA6A_1100	UPPER DU BEARING		
SWA6A_1100	FIND #	PART #	DESCRIPTION	MAT'L	SPEC.
QTY	PARTS LIST				
NEXT ASSY (S)	<b>APICAL INDUSTRIES</b> 2608 TEMPLE HEIGHTS DR. OCEANSIDE, CA. 92056-3512 (760)724-5300				
SWA6A					
	UPPER DU BEARING				
	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: 2 PLACE DECIMALS $\pm .01$ 3 PLACE DECIMALS $\pm .005$ ANGLES $\pm .5^\circ$				
	SIZE B	CAGE CODE 07MZ6	DWG. NO. SWA6A_1100	REV. N/C	
	SCALE NONE				SHEET 1 OF 1



**APICAL**  
INDUSTRIES, INC.

ENGINEERING CHANGE NOTICE NO. 03017

SHEET 1 JF 1

DWG NO. SWA6A-1100

REV: NC

PREPARED BY: N.CAP

DATE: 12/07/10

EFFECT ON DWG  
☐ INC. ☒ UNINC.

DWG TITLE: UPPER DU BEARING

APPROVED BY:

ENGR. *[Signature]*

MECH. *[Signature]*

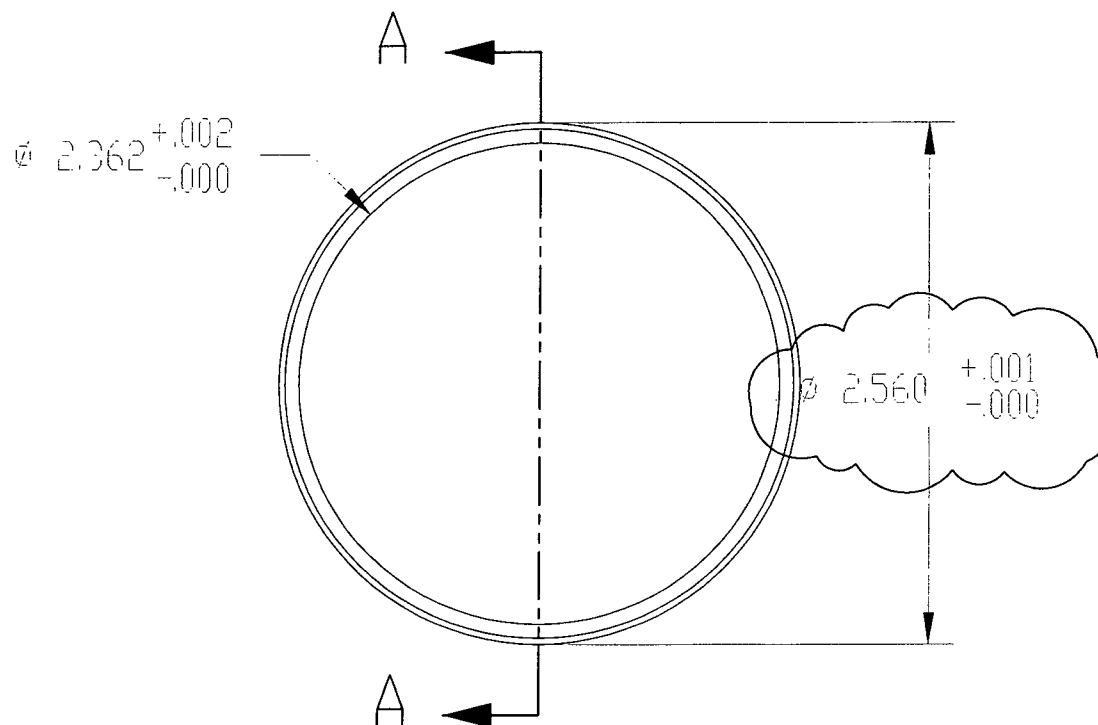
QC *[Signature]*

EFF: CURRENT ORDER

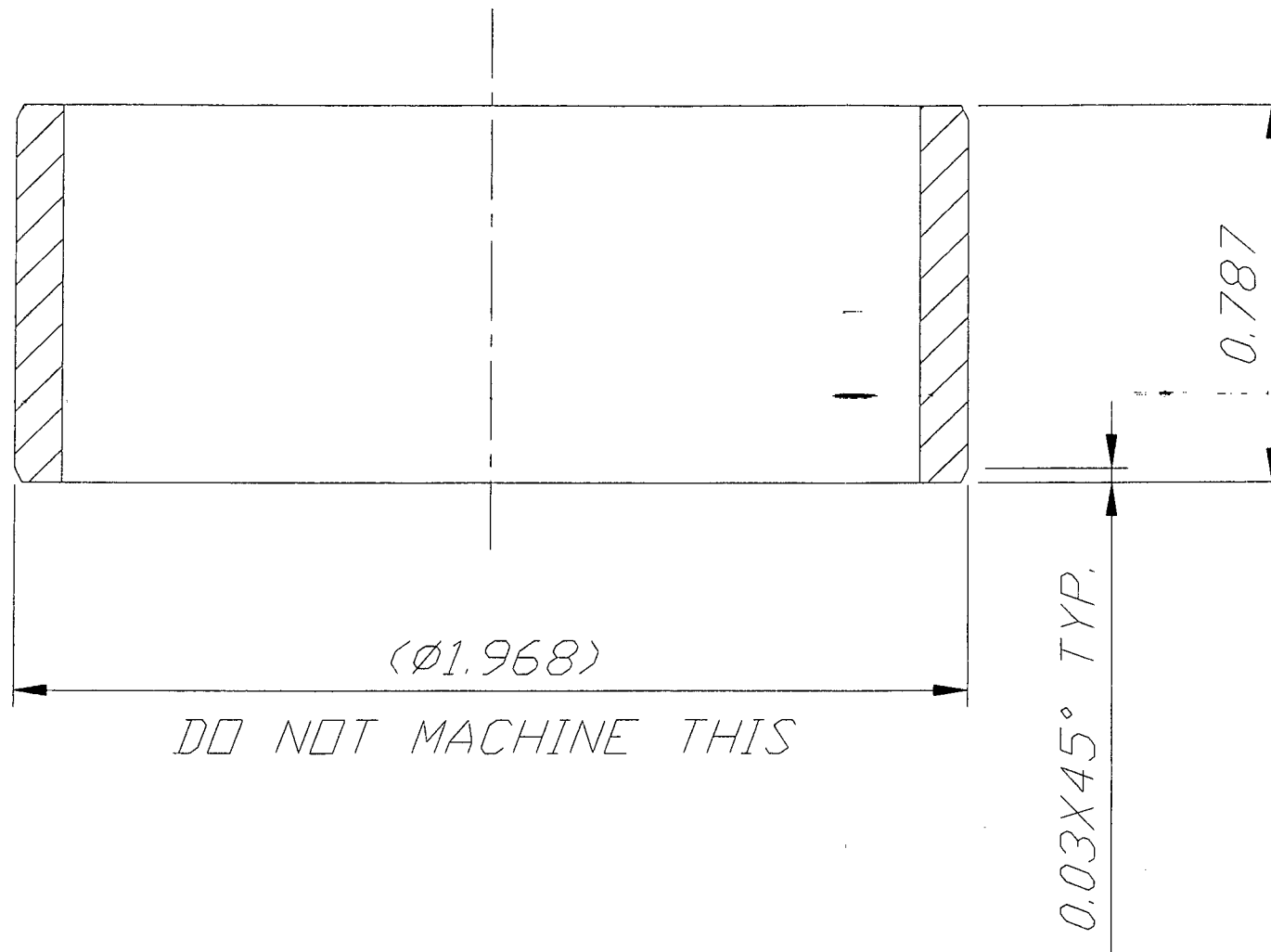
TRANSACTION CODES (TC):  
A-ADD C-CREATE  
R-REVISE D-DELETE

REASON: REVISED OD (AS PER ECR 10-55)

SHEET 1, ZONE C3, IS:



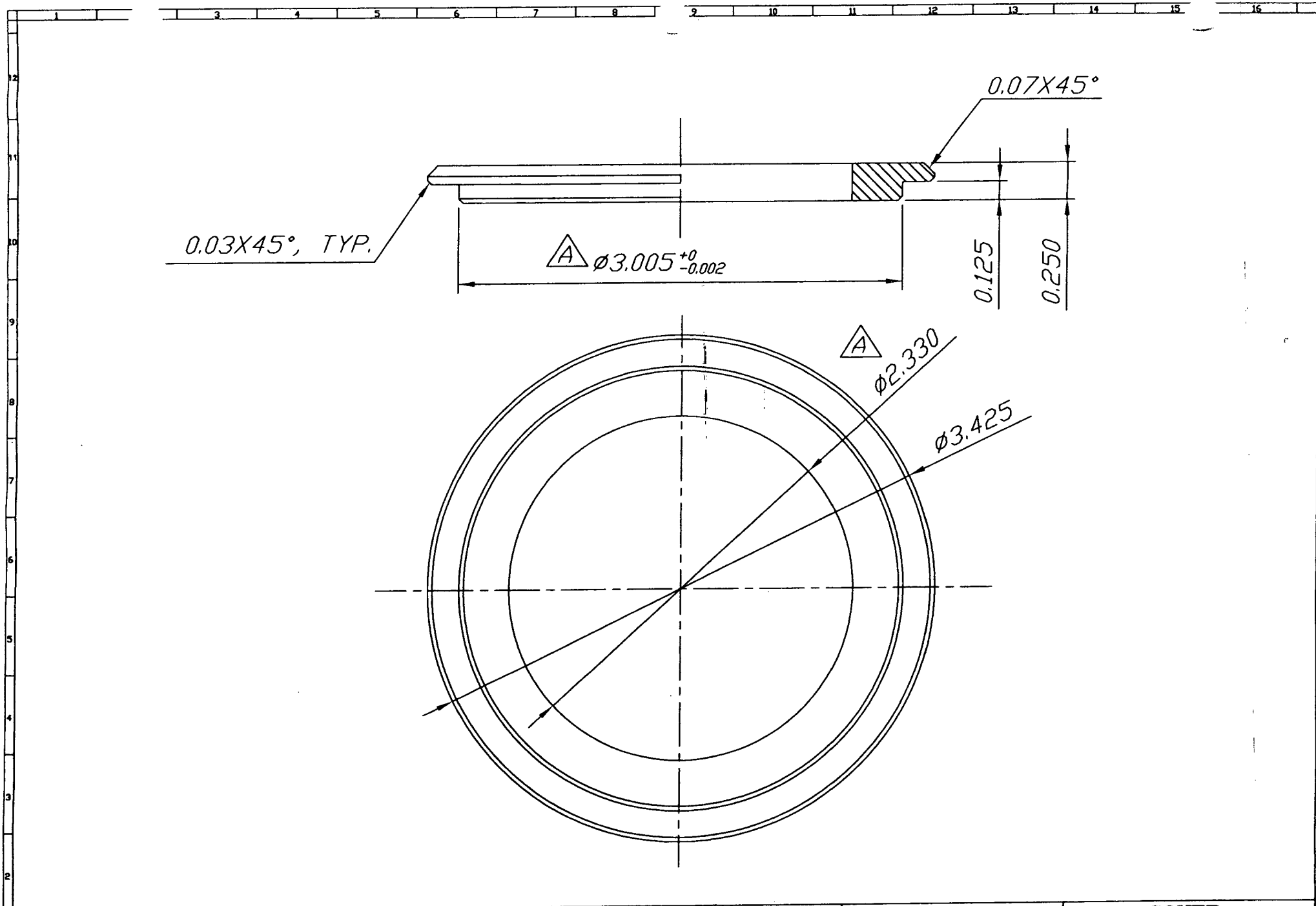
F/N	TC	PART NUMBER	QTY	DESCRIPTION	MATERIAL	SPECIFICATION	
DOCUMENTS EFFECTED:				<input type="checkbox"/> MDL <input type="checkbox"/> INSTALL INSTRUC <input type="checkbox"/> ICA <input type="checkbox"/> BOM	CHANGE CATEGORY <input type="checkbox"/> MAJOR <input checked="" type="checkbox"/> MINOR	DER REVIEW REQUIRED <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	



ORIGINAL PART: MB4520DU

LENGTH HAS TO BE MODIFIED ONLY IF THE DU BEARING IS NOT STOCK SIZE

REVISION				TOLERANCES		IMPORTANT	DESIGNED:	SCALE:	CANAM		LOWER DU BEARING			
DRAWING NAME & NO. CHANGED				Fraction			CANAM	NTS			SWA6A SWIVEL			
A				± 1/64		NOTE: All dimensions are in inch unless specified. Break all sharp edges.	DRAWN:	DATE:	MATERIAL:	FINISH:	PART No.	DRAWING No.	QUANTITY:	REV.
B				± .015			CSABA A. KODOR	Apr.03.02						
C				± .010			CHECKED BY:							
D				± .005			APPROVED BY:							
E				± 0.010										
E				0.000							SWA6A_1200	SWA6A_1200	1	1



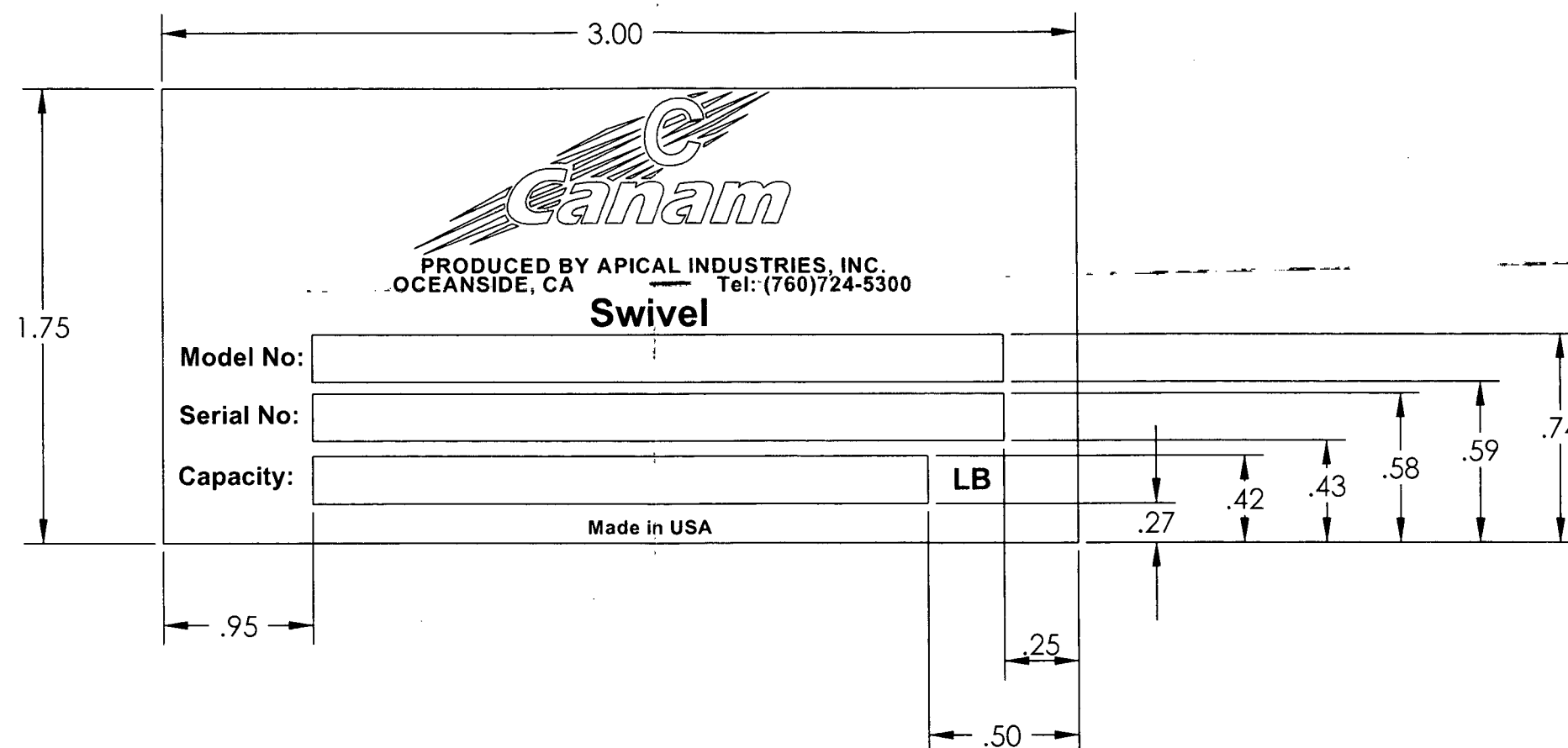
REVISION				TOLERANCES		IMPORTANT	DESIGNED		SCALD		COVER	
A	BY	CHANGED	DATE	Fraction	±		CANAM		NTS			
1	DR	DRAWING NO. CHANGED	Apr.03.02	.X	±	NOTE: All dimensions are in inch unless specified. Break all sharp edges.	DRAWN		DATE		CANAM	
2	DR		06.08.05	.XX	±		CSABA A. KODOR		Apr.03.02.02			
3	DR			.XXX	±		CHECKED BY		MISC No			
4	DR			.000	±		APPROVED BY		PROJECT No			
5	DR			.001	±				Jan.22.02			
6	DR			.002	±				SS		SWA6A_1800	
7	DR			.003	±						SWA6A_1800	
8	DR			.004	±						SWA6A_1800	
9	DR			.005	±						SWA6A_1800	
10	DR			.006	±						SWA6A_1800	
11	DR			.007	±						SWA6A_1800	
12	DR			.008	±						SWA6A_1800	
13	DR			.009	±						SWA6A_1800	
14	DR			.010	±						SWA6A_1800	
15	DR			.011	±						SWA6A_1800	
16	DR			.012	±						SWA6A_1800	
17	DR			.013	±						SWA6A_1800	
18	DR			.014	±						SWA6A_1800	
19	DR			.015	±						SWA6A_1800	
20	DR			.016	±						SWA6A_1800	
21	DR			.017	±						SWA6A_1800	
22	DR			.018	±						SWA6A_1800	
23	DR			.019	±						SWA6A_1800	
24	DR			.020	±						SWA6A_1800	
25	DR			.021	±						SWA6A_1800	
26	DR			.022	±						SWA6A_1800	
27	DR			.023	±						SWA6A_1800	
28	DR			.024	±						SWA6A_1800	
29	DR			.025	±						SWA6A_1800	
30	DR			.026	±						SWA6A_1800	
31	DR			.027	±						SWA6A_1800	
32	DR			.028	±						SWA6A_1800	
33	DR			.029	±						SWA6A_1800	
34	DR			.030	±						SWA6A_1800	
35	DR			.031	±						SWA6A_1800	
36	DR			.032	±						SWA6A_1800	
37	DR			.033	±						SWA6A_1800	
38	DR			.034	±						SWA6A_1800	
39	DR			.035	±						SWA6A_1800	
40	DR			.036	±						SWA6A_1800	
41	DR			.037	±						SWA6A_1800	
42	DR			.038	±						SWA6A_1800	
43	DR			.039	±						SWA6A_1800	
44	DR			.040	±						SWA6A_1800	
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47	DR			.043	±						SWA6A_1800	
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49	DR			.045	±						SWA6A_1800	
50	DR			.046	±						SWA6A_1800	
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66	DR			.062	±						SWA6A_1800	
67	DR			.063	±						SWA6A_1800	
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98	DR			.094	±						SWA6A_1800	
99	DR			.095	±						SWA6A_1800	
100	DR			.096	±						SWA6A_1800	

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REVISION			
REV.	DESCRIPTION	DATE	APPROVED

# NOTES:

1. MATERIAL: 3M7940 MATTE ALUMINUM FOIL
2. BACKGROUND COLOR RED
3. TEXT, TEXT BOXES, AND LOGO NO PAINT



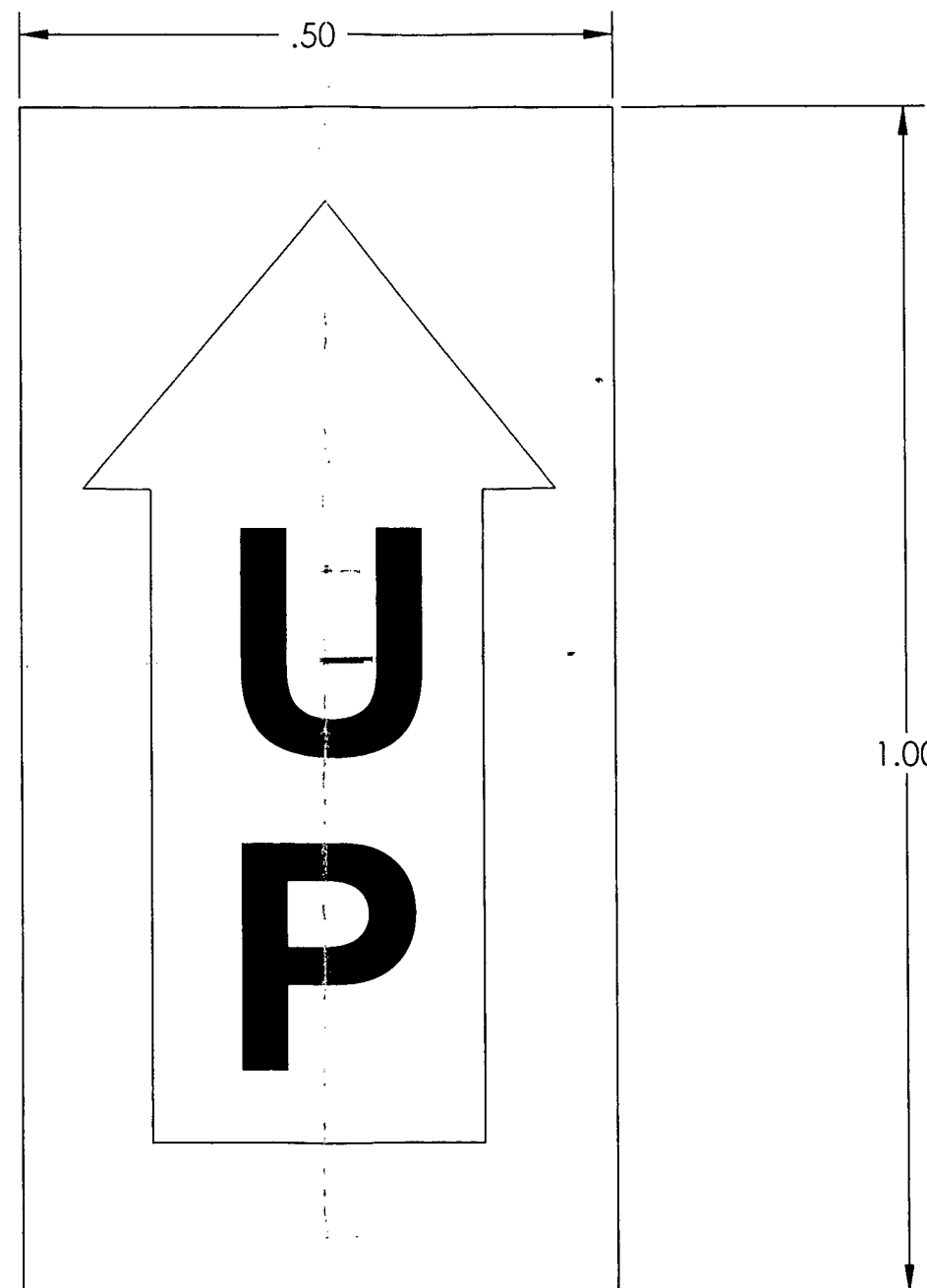
NEXT ASSY (\$)		ORIGINAL DATE (DA-MO-YR) 2/17/09	APICAL INDUSTRIES 2608 TEMPLE HEIGHTS DR. OCEANSIDE, CA. 92056-3512 (760)724-5300	
DRAWN BY A. QUAN		CHECKER D. BARKER		
DRAWING APPROVAL P. BRAVO		2/17/09	CANAM SWIVEL ID LABEL	
CONTRACT No.				
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: 2 PLACE DECIMALS ± .03 3 PLACE DECIMALS ± .010 ANGLES ± 2°			SIZE B	CAGE CODE 07MZ6
			DWG. NO. 600.1311	REV. N/C
			SCALE: NONE	
			SHEET 1 OF 1	

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THE WRITTEN PERMISSION OF APICAL INDUSTRIES IS PROHIBITED.

REVISION			
REV.	DESCRIPTION	DATE	APPROVED

NOTES:

1. MATERIAL: 3M7940 MATTE ALUMINUM FOIL
2. ARROW COLOR PAINT RED
3. TEXT AND BACKGROUND NO PAINT (SILVER)



NEXT ASSY (S)		ORIGINAL DATE (DA-MO-YR) 3/4/09	<b>APICAL INDUSTRIES</b> 2608 TEMPLE HEIGHTS DR. OCEANSIDE, CA. 92056-3512 (760)724-5300	
	DRAWN BY A. QUAN	CHECKER D. BARKER		
	3/4/09	3/4/09		
	DRAWING APPROVAL P. BRAVO			
	3/4/09		<b>CANAM ARROW LABEL</b>	
	CONTRACT No.			
	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: 2 PLACE DECIMALS ± .03 3 PLACE DECIMALS ± .010 ANGLES ± 2°		SIZE B	CAGE CODE 07MZ6
			DWG. NO. 600.1319	REV. N/C
			SCALE : NONE	
			SHEET 1 OF 1	